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DATA REPORT FOR THE BENTHIC MACROINVERTEBRATE AND PERIPHYTON COMMUNITY INVENTORY OF STREAMS DRAINING THE SOUTHERN FORT UNION COALFIELD REGION OF SOUTHEASTERN MONTANA

Prepared for the

Bureau of Land Management

and

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ABSTRACT

The Water Quality Bureau of the Montana Department of Health and Environmental Sciences has completed a two-year biological-benthic inventory of streams draining the southern Fort Union coalfield area in southeastern Montana and a small part of northern Wyoming. This study was conducted with funding made available by the United States Geological Survey. Attention was directed primarily to the benthic macroinvertebrate associations and periphyton communities that are found in these waters, and a large number of streams and sampling stations within the study area were collected for such organisms, involving the analysis of numerous biological samples. In addition, water quality collections were made throughout the project, and appropriate physical measurements were taken to supplement the biotic information. This publication is one of the final requirements of the investigation, and it is designed as a data report that presents most of the data that has been collected. The sampling program of the inventory and the related field and laboratory methods are also discussed to set the stage for reviewing the many data tables. Two companion reports to this publication will more specifically consider the macroinvertebrate and the periphyton segments of the project.

ACKNOWLEDGEMENTS

A large number of individuals besides the authors of this report became involved with the completion of the southern Fort Union region, hydrobiological-benthic inventory. Mr. Gordon Hills of the State Water Quality Bureau conducted the water quality analyses that were undertaken in the Billings branch office of the Bureau, and Mr. John Hawthorne and other staff members of the State Chemistry Laboratory Bureau in Helena conducted the remaining chemical work. Dr. George Roemhild, Mr. Dick Oswald, and other associates of the Department of Biology at Montana State University in Bozeman provided many of the taxonomic verifications and expert advice on aquatic macroinvertebrate taxonomy, sample analysis, and field collection. Mr. Erich Weber of the Water Quality Bureau assisted with the laboratory evaluations of the periphyton samples, and Mr. Rob Greene of this same agency and Mrs. Peggy Bahls helped with the statistical assessments of these collections. Mr. Greene also assisted in other phases of the project as did Mrs. Sue Cohen, Ms. Lani Morris, and Mr. Tom Costa. Mr. Don Willems provided the administrative expertise that was needed to originally initiate the study, and Mrs. Jerrine Litwin typed the different manuscripts and the many data tables.

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INTRODUCTION

During the first part of 1978, the Water Quality Bureau of the Montana Department of Health and Environmental Sciences (DHES) received a grant from the United States Geological Survey (USGS) and the Bureau of Land Management to conduct the first year of a proposed two-year biological-benthic inventory of streams draining the southern Fort Union coalfield area in southeastern Montana. This portion of Montana has an abundance of strippable coal deposits, and because of this feature, the southeastern segment of the State is expected to experience some degree of future water quality impacts from projected coal mining activities. The anticipation of these potential difficulties in view of the general paucity of biological information for many of the lotic waters in this region provided the main impetus for developing and undertaking such an inventory effort, and the basic objective of the project was to develop for future reference purposes a relatively extensive hydrobiological data base for the coalfield area that adequately characterizes and describes the benthic biota of its smaller streams.

As a second objective for the project, an attempt was to be made to ascertain the possible effects of salinity on the aquatic biota of the coalfield streams since enhanced salinity levels are forecast to have a relatively high likelihood of causing adverse instream impacts in conjunction with the expanded surface mining operations. In addition, salinity has an added and more general importance because water quality problems of this kind can also arise from other sources besides mining such as irrigation return flows and the development of saline seep locales, and both of the latter two manifestations are known to occur in the Fort Union region.

Upon notification of the receipt of funding for the inventory project, a preliminary field survey was first conducted of the study area preparatory to the establishment of appropriate sampling stations, and biological sampling at these stations was actually initiated in May of 1978 and continued through the fall of that year. Additional monies were subsequently given to the Water Quality Bureau (WQB) to extend the sampling through a second year, and with this extension, field work proceeded to a final termination date in early November of 1979. All of the laboratory analyses of the biological samples collected during the study were then completed in June of 1980 leading to the preparation of the final project reports.

The focus of the coalfield sampling program was directed to the benthic macroinvertebrate associations (aquatic "bugs") that inhabit the bottoms of the streams and to the streams' periphyton communities and their macroalgae components. Two standing waters were also sampled for some of these organisms as miscellaneous collections. The term periphyton refers to an assemblage of microscopic algae (primarily diatoms) and other small organisms that grow attached to submersed surfaces such as rocks and logs, and this community typically forms a brown and slippery covering over such objects. Both the periphyton and the larger benthic macroinvertebrates are important to aquatic systems as food chain elements, and they also serve as valuable indicators of water quality. In addition to the obtainment of these biological samples *per se*, different kinds of physical measurements, e.g., current velocity and stream depth at the sampling point, were also taken at

the time of the biological sampling, and a large data pool of this type is now available for the southern Fort Union streams. Such physical applications along with the collection of numerous water quality samples were initiated in order to supplement the study's biotic data for interpretive purposes.

The end result of this inventory work was the eventual collection and analysis of 321 water quality, 288 periphyton-macroalgae, and 269 macroinvertebrate samples. The main intent of this particular presentation, therefore, is to compile a data report that lists in tabular fashion all of the water quality, macroinvertebrate, periphyton community-macroalgae, and physical information that has been collected during the past few years as a part of this project. These data are included in the appendix of this publication. Furthermore, summaries of the sampling program and the methodologies that were used are also included to set the stage for assessing the biological data. Two companion reports to this writing will also be available, one dealing with the benthic macroinvertebrate associations and the other with the periphyton communities, and each of these reports will more specifically detail the results that were obtained from the macroinvertebrate and periphytic components of the overall study. Earlier writings associated with the project include the two research proposals that were developed prior to the receipt of each year's funding (USGS Grant Number 14-08-0001-6-503) and an interim report that was prepared in the late spring of 1979 (Klarich, 1977, 1978, and 1979).

DESCRIPTION OF THE STUDY AREA

A major portion of the project study area consists of that part of the Fort Union region that is found in southeastern Montana south of the Yellowstone River and between the Bighorn River and the O'Fallon Creek-Little Missouri River drainages. As indicated in Figure 1, a minor deviation to this general description is the small southwestern "hump" that is located in Wyoming along the Tongue River, although all of the study region is within the Yellowstone Basin. With the exclusion of this Wyoming "hump," the Montana-Wyoming state line represents the southern boundary of the study area while the Yellowstone River delineates its northern limit. Several sampling stations were established on small streams such as Sarpy Creek that drain directly to the Yellowstone, and four sampling locations on the Tongue and its tributaries were collected in the small Wyoming segment. In addition, three sites were sampled in the Powder River drainage so that the eastern divide of this river system defines the eastern boundary of the study region; the western Sarpy Creek divide, the southwestern Rosebud Creek divide, and the extreme southwestern Tongue River divide, in turn, denote its most western extension. However, the bulk of the sampling actually took place on streams within Montana's Rosebud Creek and Tongue River drainages, and these systems thereby represent the central core of the project region.

Figure 1 presents a map of the study area that shows the general locations of the many biotic sampling stations. These stations will be considered in more detail in the next section of this report, and this will include a referencing of the site numbers that are contained on the map.

Figure 1. Map of the southern Fort Union study area in Montana and a small part of Wyoming showing the locations of the various sampling stations.

SUMMARY OF THE SAMPLING PROGRAM

SAMPLING STATIONS

As illustrated in Figure 1, 43 stations on 34 rivers and creeks of varying sizes and two standing waters were sampled during the course of the project in five minor drainage basins as defined by the USGS (1968). Most of the rivers and creeks had only one sampling site, although five of the streams were sampled at two distinct stations while one of the creeks was collected at three separate sites. Many of these streams were either typically perennial in nature showing a distinct discharge on each of the project trips, (e.g., Otter and Hanging Woman Creeks), or they have a relatively extensive drainage system (e.g., Pumpkin and Mizpah Creeks), and such features formed one of the major criteria for choosing each of the selected sites. To a large degree, therefore, attention was directed primarily to the smaller perennial waters of the study area, but a few of the intermittent and "water-gap" creeks and a few of the larger streams were also collected. The term "water-gap" in this report refers to streams that are continuously flowing or intermittent but only through short sections of their total length; that is, ephemeral reaches can be found between the flowing segments.

The smaller creeks in the study area were stressed in this project because very little in the way of biological data are on hand for this type of water in the Fort Union region. In contrast, some information of this kind is now available for the larger lotic systems of the region because of the completion of earlier biotic studies, e.g., Rosebud Creek (Baril, et al, 1978) and the Tongue River (Newell, 1977). Nevertheless, these larger waters were still sampled to some extent during this more recent investigation as a means of providing a direct basis of data comparison for the smaller aquatic systems in relation to the biology of first order streams of the area.

Another major criteria for station selection in the study area was the ease of access to a potential sampling site and its availability on the major travel routes, and the negative nature of these factors accounts for the lower frequency of sampling at some of the stations. Also, an attempt was made to sample different specific stream locations on each visit to a station in order to avoid a biasing of the more recent collections. To accommodate such a sampling need, each of the stations was defined as containing a considerable expanse of stream both above and below the direct access point, and the utilization of this definition provided the opportunity to meet this particular field requirement throughout the study period. In some instances, the different sampling locations at a station were far enough apart to be found in separate quarter-sections and/or sections, or even in separate townships and/or ranges, and this feature will be illustrated later in this report.

Two classes of sampling sites were ultimately developed for the coalfield aquatic inventory. These were termed the "intensive" and the "accessory" stations, and the latter category might be further split into another subclass that has been labelled the "miscellaneous" stations of the study. The main objective of sampling at the intensive sites was to provide for in-depth, replicated, and seasonal biological data for a select set of

representative stream stations, while the point of the accessory sites was to provide for a broad overview of the biological characteristics of a wide variety of waters in the southern Fort Union region. As a result, the intensive stations were sampled much more frequently and for a wider spectrum of biological applications than the accessory sites, although a much larger assortment of accessory sites than intensive sites was collected during the project. For the most part, the intensive stations were established on the more important smaller creeks of the study area with these streams having perennial, relatively high flow, and/or comparatively large drainage area characteristics. However, two intensive stations were also located on two of the region's largest streams in order to afford the basis of data comparison for the smaller waters that was noted earlier. In the case of the accessory sites, a wide range of both small and large streams was sampled in order to gain the broad biological overview that was required for this phase of the inventory.

In contrast to the intensive and accessory stations, the miscellaneous stations were sampled only on a few occasions and only for an incomplete set of biological data relative to what was collected at the normal accessory sites. These miscellaneous stations generally represent the "curiosity collections" that were added to the main sampling program after the inventory got underway. But nevertheless, the data from these stations will also contribute to any complete biological descriptions of the study area waters.

The nine intensive, the 24 accessory, and the ten miscellaneous stations that were established in the study area are listed in Table 1. In addition, the township (T), range (R), section (two-digit number), and quarter-section (letter) geographic descriptions for the main sampling location of each station are also included along with a few other pertinent items. The geographic designations for a site in Table 1 correspond to a general length of stream that was sampled most frequently during the project. However, it should again be mentioned that different specific stream locations within this reach were collected on each visit to a station, although these specific locations were not appropriately spaced in this case to require different geographic descriptions. The more widely-spaced alternate locations that did warrant separate designations are noted in the water quality tables of the Appendix (Tables A01 to A33), and the relationships between a particular biotic-water quality collection at a station and the corresponding geographic description are also indicated in these same summaries.

A few other features with reference to Table 1 should also be noted. First, the "stream type" listings in the table were based only on the field observations that were made during the many trips through the study area and not on any extra-study information. Second, the "basin code" specifications were taken from a USGS (1968) drainage basin map. Third, each of the 43 station numbers presented in Figure 1 are referenced in this table to a particular stream site, and as a fourth item, the intensive, accessory, and miscellaneous classifications of the different stations are also included in this summary.

Table 1. List of intensive (I), accessary (A), and miscellaneous (M) stations established in the southern Fort Union study region along with their associated geographic descriptions and other pertinent items (the first page of two pages).

Stream and Station	Station Number-Type	Main Sampling Location	Stream Type	Basin Code	Drainage Basin	Tributary to:
Upper Rosebud Creek near Kirby	07-I	T06S,R39E,20C	mlp	42A	Upper Rosebud	Yellowstone River
Unnamed Pond (Slough) near Kirby	38-M	T05S,R38E,36A	sw	42A	Upper Rosebud	--
Middle Rosebud Creek near Colstrip	35-A	T01N,R43E,19A	lp	42A	Middle Rosebud	Yellowstone River
Lower Rosebud Creek near Rosebud	36-A	T06N,R42E,16D	lp	42A	Lower Rosebud	Yellowstone River
Indian Creek near Kirby	24-A	T06S,R39E,31D	mlp	42A	Upper Rosebud	Rosebud Creek
Davis Creek near Busby	21-A	T04S,R38E,11D	si	42A	Upper Rosebud	Rosebud Creek
Muddy Creek near Busby-Lame Deer	29-A	T02S,R40E,35C	sp	42A	Middle Rosebud	Rosebud Creek
Lame Deer Creek near Lame Deer	26-A	T03S,R41E,10A	sp	42A	Middle Rosebud	Rosebud Creek
Cow Creek near Colstrip	18-M	T01N,R43E,06D	si	42A	Middle Rosebud	Rosebud Creek
Tongue River near Sheridan-Decker	41-A	T57N,R84W,01C#	mjp	42B	Upper Tongue	Yellowstone River
Interstate Ditch near Sheridan-Decker	25-M	T57N,R84W,01B#	a	42B	Upper Tongue	Tongue River
Ash Creek near Sheridan-Decker	12-A	T57N,R84W,01B#	sp	42B	Upper Tongue	Tongue River
Youngs Creek near Sheridan-Decker	43-A	T58N,R83W,30B#	sp	42B	Upper Tongue	Tongue River
Tongue River near Pyramid Butte-Birney	09-I	T06S,R42E,31D	mjp	42B	Upper Tongue	Yellowstone River
Squirrel Creek near Decker	08-I	T09S,R40E,29C	sp	42B	Upper Tongue	Tongue River
Deer Creek near Decker	22-A	T09S,R41E,10C	si	42B	Upper Tongue	Tongue River Reservoir
Canyon Creek near Decker-Birney	16-A	T07S,R41E,11C	sp	42B	Upper Tongue	Tongue River
Prairie Dog Creek near Pyramid Butte-Birney	31-A	T06S,R42E,31D	si-wg	42B	Upper Tongue	Tongue River
Bull Creek near Pyramid Butte-Birney	15-A	T06S,R42E,19A	sp	42B	Upper Tongue	Tongue River
Crazy Head Springs (pond) near Ashland-Lame Deer	20-M	T02S,R42E,35C	sw	42B	Upper Tongue	--
Cook Creek near Birney-Birney Village	17-A	T05S,R42E,25B	wi	42C	Middle Tongue	Tongue River

*mlp--Moderately-large perennial; sw--standing water; lp--large perennial; si--small intermiitent based on the drainage area; sp--small perennial; mjp--major perennial; a--irrigation canal; wg--"water gap." #Wyoming designations.

Table 1. Continued (the second page of two pages).

Stream and Station	Station Number-Type	Main Sampling Location	Stream Type*	Basin Code	Drainage Basin	Tributary to:
Logging Creek near Ashland	28-A	T03S,R44E,20C	si	42C	Middle Tongue	Tongue River
Beaver Creek near Brandenberg (b)	14-A	T01S,R46E,20B	sp?	42C	Middle Tongue	Tongue River
Upper Hanging Woman Creek near Quietus-Decker	03-I	T08S,R43E,16C	sp	42B	Upper Tongue	Tongue River
Lower Hanging Woman Creek near Birney	02-I	T06S,R43E,19D	sp	42B	Upper Tongue	Tongue River
Stroud Creek near Quietus-Decker	39-M	T08S,R43E,02A	si	42B	Upper Tongue	Hanging Woman Creek
Lee Creek near Quietus-Birney	27-M	T07S,R44E,20D	si-wg	42B	Upper Tongue	Hanging Woman Creek
East Fork of Hanging Woman Creek near Birney	01-I	T06S,R43E,20D	sp-wg	42B	Upper Tongue	Hanging Woman Creek
Bear Creek near Otter	13-A	T07S,R45E,27A	sp	42C	Middle Tongue	Otter Creek
Upper Otter Creek near Otter-Fort Howe	30-A	T07S,R45E,13D	sp	42C	Middle Tongue	Tongue River
Cow Creek near Otter-Fort Howe	19-A	T06S,R45E,17D	sp	42C	Middle Tongue	Otter Creek
Lower Otter Creek near Ashland	05-I	T03S,R44E,12C	sp	42C	Middle Tongue	Tongue River
Pumpkin Creek near Miles City	06-I	T06N,R48E,35C	li	42C	Lower Tongue	Tongue River
Mizpah Creek near Mizpah	04-I	T06N,R51E,24C	li	42J	Lower Powder	Powder River
East Fork of Armells Creek near Colstrip	23-M	T03N,R41E,28C	si	42KJ	Middle Yellowstone	Armells Creek
West Fork of Armells Creek near Colstrip	42-A	T04N,R40E,32B	si	42KJ	Middle Yellowstone	Armells Creek
Main Armells Creek near Colstrip	10-M	T04N,R40E,16B	si	42KJ	Middle Yellowstone	Yellowstone River
Lower Armells Creek near Forsyth	11-A	T06N,R39E,26B	sp	42KJ	Middle Yellowstone	Yellowstone River
Sweeney Creek near Rosebud	40-A	T06N,R43E,22A	sp	42KJ	Middle Yellowstone	Yellowstone River
Reservation Creek near Forsyth-Hysham	34-A	T06N,R38E,26B	sp	42KJ	Middle Yellowstone	Yellowstone River
Sarpy Creek near Hysham	37-A	T06N,R37E,20A	sp	42KJ	Middle Yellowstone	Yellowstone River
Powder River near Moorhead	33-M	T09S,R48E,08C	mjp	42J	Upper Powder	Yellowstone River
Powder River near Mizpah	32-M	T06N,R52E,30D	mjp	42J	Lower Powder	Yellowstone River

*si--Small intermittent based on the drainage area; sp--small perennial; ?--intermittent near the mouth; wg--"water-gap"; li--large intermittent based on the drainage area; mjp--major perennial; (b)--near Ashland.

As a final comment, the Pumpkin and Mizpah Creek locations were classified as intensive stations during the first field season but sampled as accessory sites during the second year while the reverse was true for the Squirrel and East Fork Hanging Woman Creek sites. This change was initiated in light of the station definitions and criteria because of the intermittent nature and poor access of Pumpkin and Mizpah Creeks in contrast to the perenniality and easy access of the other two streams. That is, both Pumpkin and Mizpah Creeks were far removed from the central core of the study area. Furthermore, both Squirrel Creek and the East Fork of Hanging Woman Creek appeared to have a greater potential for being more immediately affected by future coal development than the two more northern streams, and extra biological data from the two perennial waters, thereby, seemed to better coincide with the main theme of the project.

SAMPLING FREQUENCY AND OTHER ASPECTS

One of the main differences between the intensive and the normal accessory stations of project was related to the frequency of collection at the two classes of sites where macroinvertebrate and periphyton sampling was much more intense at the first type of station. An attempt was made to collect the intensive stations for the macroinvertebrates on a monthly basis through a mid-spring to mid-fall period during each of the two field seasons so that data might be available for each of the months within this span with some duplicate monthly data also on hand for the nine intensive sites. Furthermore single winter collections were also taken from a select set of intensive locations. As a result, six to eight macroinvertebrate samples were obtained for analyses from each of these stations for each year of the study. Periphyton-macroalgae sampling at these intensive stations was also organized on a largely monthly basis, and between 13 and 20 samples of this kind were obtained from each of the intensive stations of the entire study period. Fewer macroinvertebrate and periphyton samples were obtained from the Pumpkin, Mizpah, Squirrel, and East Fork Hanging Woman Creek locations than from the other intensive sites because of the mid-project change in the intensive-accessory status of these four streams.

In contrast to the intensive stations, only one to three macroinvertebrate samples were typically collected from the accessory sites during any of the two field seasons. This then totals between one and seven collections of this kind for each of the secondary sites through the entire inventory rather than the 14 to 19 samples obtained from the major stations. In addition, only between two and eight periphyton-macroalgae samples were typically obtained from the accessory stream locations during the two-year period. Since a few of the accessory stations were only sampled during the second year of the study and not during the first field season, this factor further accounts for the lower sample numbers that were obtained in these particular cases. Similar to the intensive sites, an attempt was made to collect samples from each of the accessory stations during a different month, or at least during a different season of the year, in order to afford some level of seasonal data for these streams also. However, this requirement could not always be fulfilled because of scheduling conflicts with the more important field trips to the intensive sites.

As a subclass of the accessory station category, the ten miscellaneous stations of the project area were also collected on a low frequency basis, but these particular stations differ from the normal accessory sites in being typically sampled only for the periphytic component of the benthic biota and not for the macroinvertebrates. However, two miscellaneous collections for the benthic fauna were taken from the Powder River. Such miscellaneous sampling generally involved only one visit to a site, although a few extra periphyton samples were collected from two of these minor stations.

A major proportion of the inventory's macroinvertebrate samples were collected from the natural substrates of the study area streams through the use of Surber sampler methodologies, and this application was made at both the intensive and the accessory stations. In turn, the bulk of the periphyton community and macroalgae samples were also obtained from these natural substrates by scraping submerged rocks and other objects. As an alternative, some of the macroalgae were collected by simply "picking" the required specimens from the stream. These two sampling approaches for the algae were also utilized at both classes of stations. As a further manipulation, the use of artificial substrates were employed at some of the sites as a means of collecting additional macroinvertebrate (jumbo multiplate or Hester-Dendy samplers) and periphyton (plexiglass plates) samples. However, these artificial applications were restricted to the intensive stations and were not used at the accessory sites, and this feature then represents another major difference between the two classes of project sampling locations. Because of the use of artificial substrates at the intensive sites, a broader range of biological data is available for these major streams over the data that are on hand for the region's accessory waters. The data obtained from the artificial substrates afford a somewhat different interpretive tool to the study relative to what would have been available if the natural substrates were sampled alone.

Table 2 summarizes the numbers and types of biological samples that were collected during the two years of this recent inventory project. As indicated in the table, numerous sets of physical measurements (stream current velocity, depth, and width along with stream flow estimates and a substrate classification) and a number of water quality samples were also obtained from the coalfield area streams to supplement the biological information. That is, quality and physical data were obtained to help define the habitat characteristics of the related biotic collections and to provide the potential for evaluating the different environmental factors such as salinity that might have a significant effect on these benthic organisms. Since the USGS has a rather extensive water quality monitoring program in the southern Fort Union region (USGS, 1979a), the sampling program of this inventory was initially developed to take advantage of this feature, and many of the project's biological stations, and particularly its intensive sites, were placed in close proximity to the USGS monitoring locations (Table 3) so that this agency's water quality data would also be applicable to this inventory. The location of the project sampling sites in this fashion formed another major criteria for station siting within the study area.

Table 2. Numbers and types of biological samples and numbers of physical measurements and water quality samples taken from the different study area streams (the first page of two pages). The symbols of the column headings are defined on the following page.

Stream and Station	WQ	Macroinvertebrates: Surber F	Surber S	Surber T	Surber UA	Art. F	Art. S	Art. T	Physical: Sur.	Physical: Art.	Physical: Sub.	Periphyton: A	Periphyton: B	Periphyton: C	Periphyton: D	Periphyton: T	Periphyton: E
Upper Rosebud Creek near Kirby.....	22	8	6	14	0	6	6	12	14	15	14	9	1	5	1	16	3
Unnamed Pond (Slough) near Kirby.....	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Middle Rosebud Creek near Colstrip.....	6	2	1	3	0	0	0	0	4	0	3	1	4	0	0	5	0
Lower Rosebud Creek near Rosebud.....	5	0	1	1	0	0	0	0	1	0	1	1	3	0	0	4	0
Indian Creek near Kirby.....	9	3	3	6	0	0	0	0	6	0	6	0	7	1	1	9	0
Davis Creek near Busby.....	4	2	1	3	0	0	0	0	4	0	3	1	3	0	0	4	0
Muddy Creek near Busby-Lame Deer.....	6	2	2	4	0	0	0	0	4	0	4	1	5	0	0	6	0
Lame Deer Creek near Lame Deer.....	6	2	2	4	0	0	0	0	4	0	4	1	4	0	0	5	0
Cow Creek near Colstrip.....	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Tongue River near Sheridan-Decker.....	8	2	2	4	0	0	0	0	4	0	4	1	3	0	0	4	0
Interstate Ditch near Sheridan-Decker.....	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Ash Creek near Sheridan-Decker.....	5	1	2	3	0	0	0	0	3	0	3	1	3	0	0	4	0
Youngs Creek near Sheridan-Decker.....	6	0	2	2	0	0	0	0	2	0	2	1	3	0	0	4	0
Tongue River near pyramid Butte-Birney.....	22	7	6	13	0	3	5	8	13	14	13	11	0	3	1	15	3
Squirrel Creek near Decker.....	15	2	7	9	0	0	6	6	9	9	9	10	0	1	1	12	7
Deer Creek near Decker.....	5	2	1	3	0	0	0	0	3	0	3	1	3	0	0	4	0
Canyon Creek near Decker-Birney.....	6	0	3	3	0	0	0	0	3	0	3	1	3	0	0	4	0
Prairie Dog Creek near Pyramid Butte-Birney..	5	0	2	2	0	0	0	0	3	0	2	1	2	0	0	3	0
Bull Creek near Pyramid Butte-Birney.....	3	0	2	2	0	0	0	0	2	0	2	1	1	0	0	2	0
Crazy Head Springs (pond) near Ashland-Lame Deer...	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Cook Creek near Birney-Birney Village.....	4	2	1	3	0	0	0	0	4	0	3	2	2	0	0	4	0
Logging Creek near Ashland.....	5	2	1	3	0	0	0	0	4	0	3	1	4	0	0	5	0
Beaver Creek near Brandenberg.....	6	3	2	5	0	0	0	0	6	0	5	1	6	0	0	7	0
Upper Hanging Woman Creek near Quietus-Decker	22	8	6	14	0	5	6	11	14	15	14	10	1	2	1	14	4
Lower Hanging Woman Creek near Birney.....	26	7	9	16	2	6	6	12	18	19	16	13	2	3	1	19	4
Stroud Creek near Quietus-Decker.....	3	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	0
Lee Creek near Quietus-Birney.....	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
East Fork of Hanging Woman Creek near Birney	19	4	7	11	0	0	6	6	11	9	11	12	0	2	1	15	4
Bear Creek near Otter.....	4	0	3	3	0	0	0	0	3	0	3	1	1	0	0	2	0

Table 2. Continued (the second page of two pages).

Stream and Station	Macroinvertebrates								Physical			Periphyton					
		Surber				Art.											
	WQ	F	S	T	UA	F	S	T	Sur.	Art.	Sub.	A	B	C	D	T	E
Upper Otter Creek near Otter-Fort Howe.....	8	2	5	7	0	0	0	0	7	0	7	1	5	0	0	6	0
Cow Creek near Otter-Fort Howe.....	3	0	2	2	0	0	0	0	3	0	2	1	2	0	0	3	0
Lower Otter Creek near Ashland.....	23	7	8	15	1	5	6	11	16	15	15	10	2	2	1	15	5
Pumpkin Creek near Miles City.....	12	6	2	8	0	4	0	4	8	5	8	7	1	0	1	9	4
Mizpah Creek near Mizpah.....	11	6	2	8	0	5	0	5	8	11	8	7	1	0	1	9	4
East Fork of Armells Creek near Colstrip.....	3	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	0
West Fork of Armells Creek near Colstrip.....	4	1	1	2	0	0	0	0	3	0	2	2	2	0	0	4	0
Main Armells Creek near Colstrip.....	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Lower Armells Creek near Forsyth.....	6	0	3	3	0	0	0	0	3	0	3	1	4	0	0	5	0
Sweeney Creek near Rosebud.....	7	2	2	4	0	0	0	0	4	0	4	1	5	0	0	6	0
Reservation Creek near Forsyth-Hysham.....	7	3	2	5	0	0	0	0	5	0	5	2	4	1	0	7	0
Sarpy Creek near Hysham.....	7	2	2	4	0	0	0	0	5	0	4	1	5	0	0	6	0
Powder River near Moorhead.....	1	0	1	1	0	0	0	0	1	0	1	1	0	0	0	1	0
Powder River near Mizpah.....	1	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0
Totals.....	321	88	103	191	3	34	41	75	203	112	191	123	97	20	10	250	38

WQ--Water quality samples. Surber--Macroinvertebrate samples collected from natural substrates with a Surber sampler: F--first field season, S--second field season, T--total, and UA--unanalyzed samples; Art.--macroinvertebrate samples collected from artificial substrates (jumbo multiplate, Hester-Dendy samplers). Physical--Sets of physical measurements (stream width, depth, and current velocity plus estimated flow) taken in association with the Surber (Sur.) natural substrate and the artificial (Art.) substrate macroinvertebrate collections; Sub.--natural substrate evaluations made in conjunction with the Surber samples. Periphyton--The following classes of algae samples were collected from the streams:

A. Standard collections from natural substrates and standard analyses involving counts of the diatom species (generally between 300 and 400 frustules).
B. Standard collections from natural substrates but the samples analyzed for the non-diatom algae only (diatom species not counted).
C. Collections for the non-diatom algae only.
D. Collections from natural substrates with the diatom species evaluated by a "long-count" approach (more than 8,000 frustules).
T. Total of the natural substrate algae collections.
E. Same as "A" but with algae samples obtained from artificial substrates (plexiglass plates).

Table 3. List of United States Geological Survey surface water monitoring stations maintained in the southern Fort Union project region during the period of study.

Station Name	Station Number	Water Quality	Water Discharge
*Sarpy Creek near Hysham	06294940	X	X
*East Fork Armells Creek near Colstrip	06294980	X	
*Armells Creek near Forsyth	06294995	X	X
Yellowstone River at Forsyth	06295000	X	X
*Rosebud Creek near Kirby	06295110	X	
*Rosebud Creek near Colstrip	06295250	X	X
Snider Creek near Brandenberg	06295420	X	
*Rosebud Creek at mouth near Rosebud	06296003	X	X
Yellowstone River near Miles City	06296120	X	
*Squirrel Creek near Decker	06306100	X	X
Spring Creek near Decker	06306900	X	
*Tongue River at Monarch, Wyoming	06299980	X	
Tongue River at State line, near Decker	06306300		X
Tongue River Reservoir near Decker	06307000		
*Tongue River at Tongue River Dam, near Decker	06307500	X	X
*Prairie Dog Creek above Jack Creek, near Birney	06307525	X	
*Prairie Dog Creek near Birney	06307528	X	
East Fork Trail Creek near Otter	06307560	X	X
*Hanging Woman Creek below Horse Creek, near Birney	06307570	X	
*Hanging Woman Creek near Birney	06307600	X	X
*Tongue River below Hanging Woman Creek, near Birney	06307610	X	
*Otter Creek near Otter	06307665	X	
*Otter Creek below Fifteenmile Creek, near Otter	06307717	X	
Home Creek near Ashland	06307735	X	
*Otter Creek at Ashland	06307740	X	X
Tongue River below Brandenberg Bridge, near Ashland	06307830	X	X
Pumpkin Creek near Loesch	06308160	X	
*Pumpkin Creek near Miles City	06308400	X	X
Tongue River at Miles City	06308500	X	X
Yellowstone River at Miles City	06309000		X
*Powder River at Moorhead	06324500	X	X
Powder River at Broadus	06324710		X
Mizpah Creek at Olive	06326050	X	
*Mizpah Creek near Mizpah	06326300	X	X
*Powder River near Locate	06326500	X	X

*An asterisk denotes a United States Geological Survey station that generally corresponds to a biological site established for this inventory.

The water quality sampling that was completed as a part of this inventory effort was largely designed to accommodate the USGS collections of this kind in the region. Only a few samples for the common ion and metals analyses were thereby collected from those project stations in close vicinity of a USGS site in anticipation of the availability of this type of data from this agency (USGS, 1979b). However, samples for these analyses were regularly collected from the project streams that were not included in the USGS program. Also, samples for a nitrogen and phosphorous nutrient assessment were routinely collected from all of the biological stations regardless of USGS activities in this regard in order to increase the data base of these biologically important parameters. Collections for the field parameters, i.e., for pH, specific conductance, turbidity, and suspended sediment, were also obtained on almost all of the site visitations along with a temperature evaluation, and dissolved oxygen was collected on most of the sampling trips. In addition, biochemical oxygen demand (BOD), total coliforms, and silica were monitored on a few occasions in this study to further describe the quality characteristics of the study area streams.

SUMMARY OF THE METHODOLOGIES

WATER QUALITY

Many of the 33 water quality parameters that were assessed during the inventory, including the common ions, the nitrogen and phosphorous nutrients, and the metals, were analyzed by the Chemistry Laboratory Bureau of the DHES in Helena, Montana. However, all of the field parameters (temperature, pH, specific conductance, turbidity, suspended sediment, dissolved oxygen, BOD, and total coliforms) were evaluated either in the field or in the WQB's branch office laboratory in Billings, Montana, and some of the common ion and other analyses were also completed at this same facility. Water samples for most of the quality assessments were obtained from the study area waters in plastic, liter bottles and appropriately preserved on site for transport to the laboratory and for temporary storage under refrigerated conditions following Environmental Protection Agency (1979) guidelines. Furthermore, the holding-time or pre-analysis storage requirements specified by this agency were also observed throughout the project.

Standard coliform bottles were utilized for the bacteriological collections, and total coliforms were run in this project instead of the more common fecal evaluations because of the less stringent holding-time for the total variety. Collections for the dissolved oxygen (DO) determinations were made in regular BOD bottles as were the actual BOD samples, and the DO's were fixed in the field for transport following procedures described by Karp and Klarich (1978). The final titrimetric step for the latter parameter was performed in the branch office laboratory. Temperature readings were made at the stream stations using a calibrated mercury thermometer, and suspended sediment was assessed from the same grab sample that was collected for some of the other field parameter analyses. The metals evaluated during the inventory are of the total recoverable variety with acificiation performed in the field without the application of a filtration step. The analyses were then completed at the Helena laboratory without any further extraction procedures.

Table 4 presents a summary of the various methods that were used in the Billings and Helena laboratories for the analyses of the different water quality parameters.

MACROINVERTEBRATES--FIELD APPLICATIONS

Natural Substrates. A square-foot Surber stream-bottom sampler following the design presented in Slack, et al (1973) was utilized to collect a major portion of the benthic macroinvertebrate samples of the inventory (Table 2). The proper application of this sampling technique requires the presence of a fairly distinct current to sweep the aquatic organisms into the Surber net, and because of this requirement, the riffles and channels of the study area streams, by having the requisite water velocities, were stressed in this phase of the project over the more ponded stream segments. However, an ideal sampling spot of this kind could not be found at a few of the sampling locations, and in these cases, a less than ideal location had to be sampled with no other options available.

Following the selection of an appropriate sampling location at a station and the placement of the Surber into the stream, about the top six inches of the bottom material bounded by the square-foot sampling perimeter was removed after gentle agitation and placed into the net portion of the sampler; any benthic macroinvertebrates that were dislodged by this initial collection effort were then captured by the Surber net. The Surber apparatus with its collected substrates and netted organisms was subsequently moved to the shore, and the substrates were placed into a #30 mesh sieve positioned over a board base for a removal of the remaining ortanisms that were still attached to the bottom materials. The net and sieve were also cleaned before concluding the on-site work, and the collected macroinvertebrates were gradually transferred to a sample container through the entire picking process for eventual preservation. In addition, the smaller substrate materials that could not be easily surveyed in the field, such as the detritus, the macroalgae, and the finer rock particles, were also added to this same container for later picking under laboratory conditions.

After the field cleaning of the collection, the larger substrates were discarded, and the organisms and other materials contained in the sample bottle were preserved with ethanol for transport and storage until further analytical work could be directed to the collection. A small amount of rose bengal dye was added to the alcohol before its use in order to impart a color to the organisms so that they would be easier to recognize in the sample amongst the debris during the final cleaning activities undertaken in the laboratory. Through the use of this sampling approach, it is felt that fairly large percentages of the benthic macroinvertebrates that had occupied the square-foot by six inch deep layer of stream substrate were actually collected as a descrete quantitative sample that could be used for further evaluations. Those organisms slipping through the net might be defined as microinvertebrates, and as such, they could be beyond the scope of this investigation.

Table 4. Methods of water quality analysis commonly utilized by the Water Quality Bureau (B) and the Chemistry Laboratory Bureau (H) of the Montana Department of Health and Environmental Sciences (the first page of two pages).

Parameter-Symbol	Method and Laboratory	Reference*
Total Hardness--TH	EDTA titration--H and B	SM
Calcium--Ca	EDTA titration--H and B	SM
Magnesium--Mg	EDTA titration, by TH and Ca difference--H and B	SM
Sodium--Na	Flame emission--H	SM
Sodium--Na	Specific ion electrode--B(a)	Orion
Total Alkalinity--TA	Acid titration--H and B	SM
Carbonate--CO_3	Acid titration--H and B	SM
Bicarbonate--HCO_3	Acid titration--H and B	SM
Chloride--Cl	Mercuric nitrate titration--H and B	SM
Sulfate--SO_4	Thorin titration--H	USGS
Sulfate--SO_4	Barium chloride turbidimetric--B	SM
Fluoride--F	Alazarin complexone--H	EPA
Fluoride--F	Specific electrode--B(a)	Orion
Dissolved Solids--DS	Calculated, sum of constituents--H	--
Specific Conductance--SC	Wheatstone bridge (conductivity meter)--B(b)	SM
Temperature--Temp	Calibrated mercury thermometer--B	--
pH	Potentiometric (pH meter)--H and B(a)	SM
Turbidity--Turb	Nephelometric (turbidity meter)--B(c)	SM
Suspended Sediment--TSS	Fiberglass filtration, gravimetric--B(d)	SM
Dissolved Oxygen--DO	Modified Winkler--B	EPA and SM
Biochemical Oxygen Demand--BOD	Five-day sample incubation, DO analysis--B	SM
Total Coliforms--TC	Membrane filter, M-Endo Broth incubation--B	Millipore

*References are detailed on the following page.

(a)Orion Specific Ion Meter, Model 407A; (b)Lab-Line Lectro Mho-Meter, Model MC-1, Mark IV; (c)Hach Turbidimeter, Model 2100A; (d)Mettler Balance, Model H31.

Table 4. Continued (the second page of two pages).

Parameter-Symbol	Method and Laboratory	Reference*
Orthophosphate--OP(PO_4-P)	Single reagent--H(e)	EPA
Total phosphorus--TP(as P)	Persulfate digestion and single reagent--H(e)	EPA
Nitrate plus Nitrite--NO_x-N	Hydrazine reduction, diazotization--H(e)	EPA and SM
Ammonia--NH_3-N	Colorimetric phenate--H(e)	EPA
Total Inorganic Nitrogen--TIN	Calculated, sum of NO_x-N plus NH_3-N--B	--
Total Kjeldahl Nitrogen--TKjN	Digestion, distillation, phenate--H	EPA
Iron-Fe	Atomic absorption-H	SM
Iron-Fe	Phenanthroline--B	SM
Manganese--Mn	Atomic absorption--H	SM
Copper-Cu	Atomic absorption--H	SM
Zinc--Zn	Atomic absorption--H	SM
Cadmium--Cd	Atomic absorption--H	SM
Chromium--Cr	Atomic absorption--H	SM
Lead--Pb	Atomic absorption--H	SM
Mercury--Hg	Atomic absorption--H	SM
Silica--Si	Molybdosilicate--H and B	SM

(e)Auto-analyzer.

*SM--APHA, AWWA, and WPCF. 1975. Standard Methods for the Examination of Water and Wastewater.

*Orion--Orion Research. 1978. Analytical Methods Guide.

*USGS--Brown, E. et al. 1970. Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases.

*EPA--Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes.

*Millipore--Millipore Corporation. 1972. Biological Analysis of Water and Wastewater.

In terms of sampling replications for the Surber collections, the following general guideline was used for this inventory: For the relatively rich sites showing a larger number or high density of benthic macroinvertebrates, only one sample was typically collected on each of the site visits; for the less rich sites showing a comparatively small number or low density of these organisms, duplicate or triplicate samples were commonly taken from these locations and composited into a single container. For many of the creeks, the application of one Surber actually covered a fairly large proportion of the width of the stream. However, duplicate and triplicate samples were collected on occasion from all types of streams in the study area, and on some of the station visits, the subsamples were added to different sample bottles to afford the option for a separate laboratory analysis and the option for an eventual comparison of the two sets of data as illustrated in the interim report (Klarich, 1979). But for the final tabulation of the macroinvertebrate taxa numbers that were collected from any station and date, the data from the two subsamples were appropriately averaged in all instances, and this is the case for the tables in this data report.

Artificial Substrates. As noted, artificial substrates were used in conjunction with the Surber collections at each of the nine intensive stations in the study region. The use of the artificial substrates provided some flexibility to the sampling program since this methodology is not restricted by the lack of a stream current as is the case for the Surber technique. As a result, with the use of these substrates, some attention could also be directed to the macroinvertebrates that inhabit the pools of the streams as well as their flowing segments, and this aspect eventually became the main point of the artificial substrate application in the project. The data obtained from this sampling approach also acts to supplement the information that was obtained directly from the streams' natural bottom material in the riffle and channel reaches.

Jumbo multiplate (Hester-Dendy) were used as the artificial substrates in this inventory, and they were generally similar to the illustration for this type of apparatus presented in Slack, et al (1973). The jumbo multiplate variety consists of a stack of thirteen, three inch by three inch masonite plates 1/8 inch in depth that are separated by varying distances from each other through the placement of a different number of one inch by one inch, 1/8 inch deep spacers of the same material in between the main squares. The whole assembly is held together by an eight inch eyebolt placed through the center of the stack. If the eye of the bolt is visualized as the top of the sampler, the 13 plates were spaced from the top to the bottom as follows: 1/8 inch (one spacer) between the first eight plates, 1/4 inch (two spacers) between the last plate of the first set and the following plate, and 3/8 inch (three spacers) between the last five plates. The larger number of main plates and their variable spacing represents the main difference between the type of Hester-Dendy sampler described by Slack, et al, and the jumbo sampler of this kind that was used in this study.

The jumbo multiplate samplers were placed in duplicate into three different and defined stream locations, and they were held in place by a wire attached from the eyebolt of the assembly and to an instream or onshore anchor. The three types of stream locations that were examined

with these artificial substrates were chosen to reflect different aquatic habitats at a fairly general level, and these thereby involved (1) a relatively shallow riffle section having a fairly rapid current that was located in close proximity to the main Surber work, (2) a much deeper and ponded segment of the stream having a very slow current, and (3) a transition or riffle to pool, ecotonal type of reach having intermediate depth and current velocity characteristics relative to the other two locations. But regardless of these different habitat requirements, all of the samplers of a station set could be positioned in close vicinity of one another at all of the sites.

Two exposure periods and two subsequent collections of the multiplate samplers from each of the three stream locations were anticipated for five of the intensive sites during each of the two field seasons; this would equal a maximum of twelve macroinvertebrate samples of this kind in total from these particular stations. Because of the change in site classification, Mizpah and Pumpkin Creeks were sampled with artificial substrates only during the first year of the inventory, while Squirrel and East Fork Hanging Woman Creeks were sampled in this way only during the second year; therefore, a maximum of six samples could be obtained from each of these four streams. However, an in situ loss of some of the samples for various reasons such as washouts, beachings, and cattle trampling, lowered the number that could be recovered from some of the sites, and a 10% sample loss was recorded for the study.

The artificial substrates were first introduced into the streams during an early to mid-summer period of each inventory year. The samplers were then collected for the first time and reintroduced for a second exposure during the late summer or early fall, and they were collected for a final time and removed from the field to terminate a sampling cycle during the mid-fall season of the same year. One month or greater exposure periods before collection were planned for all of the samplers, but this requirement was not always possible to achieve because of the need for reintroducing those units that were found in a disturbed condition. However, 86% of the samplers were exposed for greater than one month, 47% were exposed for greater than one and one-half months, and 8% were exposed for more than two months. These exposure periods ranged from 18 days in a few instances to 63 days in a few other cases, and they averaged 42 days for all of the samplers through the entire study.

Following an exposure period, the collection of the duplicate samplers from the streams involved the underwater use of a #30 mesh sieve that was placed under the samplers with the artificial substrates then carried on the sieve as they were taken out of the water. The sieve, therefore, acted as a catch-basin, and this approach to artificial substrate collection was utilized to avoid a loss of the organisms that could be washed out of the samplers during their removal from the streams. The sieve and samplers were then moved to the shore where the sieve-confined artificial substrates were thoroughly picked, rinsed, sprayed, and scraped to dislodge the still attached macroinvertebrates. The organisms were ultimately transferred from the sieve and from the two samplers to a single container where the composite sample was preserved with an ethanol-rose bengal solution as described for the Surber

collections. The cleaned samplers were then either replaced in the stream or removed from the field depending upon the time of the year. The preserved and labelled samples, in turn, were transported to the laboratory and stored until further assessments could be made on the collections.

MACROINVERTEBRATES--LABORATORY MANIPULATIONS

Sample Sorting and Calculations. Both the artificial substrate and the natural substrate macroinvertebrate samples were analyzed in the laboratory following the same general procedures. The sample was first dumped into a #30 mesh sieve, and the initial step of the process involved a rinsing of the sample bottle and a removal and cleaning of the larger substrate materials (rocks and twigs). These substrates were eventually returned to the bottle. The sieve was then washed to remove the finer sediment particles, and the washate was checked for the occurrence of small organisms. As a second step, the remaining contents of the sieve (organisms and other materials) were transferred to a white porcelain pan where they were thoroughly mixed and randomized to an even coverage over the bottom of this container. The sample, at this stage of its preparation, was divided into quarters for a final picking and cleaning of the collected macroinvertebrates from the remaining debris. If the sample contained a low number of organisms, or if the sample was relatively clean with only small amounts detritus and macroalgae, then the entire sample (all four quarters) was picked; large quantities of macroalgae proved to be particularly bothersome to this final cleaning process. But if large numbers of macroinvertebrates were found in the sample, and/or if the sample proved to be particularly dirty, then only one or two quarters (subsamples) were picked as feasible following Environmental Protection Agency (1973) guidelines for the laboratory subsampling of macroinvertebrate collections.

The next two steps of the analytical process can be described as follows: First, the large and obvious macroinvertebrates of the collection were removed at this time from one to four of the subsample quarters as appropriate and transferred to other containers for temporary storage; second, small aliquots of the collection were sequentially taken from the porcelain pan and surveyed under a dissecting microscope with magnification so that the remaining and typically smaller organisms could be spotted and removed. Throughout the application of these two steps, each of the picked organisms was identified taxonomically and placed into a labelled, friction sealed petri dish containing a small amount of alcohol preservative until the entire set of subsamples for a collection had been cleaned of all of its organisms. The sample was thereby sorted taxonomically through this procedure with each of the dishes associated with a particular field sample containing the individuals of a particular taxa. The final counts of the taxa individuals were then taken from these dishes as a final analytical step, and the numbers were recorded on a station-date data sheet. Following the counting of the dishes, they were stored in sealed vats for an eventual biomass assessment of the macroinvertebrate taxa. Any of the subsamples in the porcelain pan that were not sorted and analyzed were returned to the original sample bottle along with the related debris for storage and future reference.

Ultimately, the numbers on the station-date data sheets enumerating the taxa individuals of a sample were refined for a tabular presentation in the final project reports. For the Surber collections, these data are presented as a quantitative density estimate for each sampling site and date, i.e., the numbers of individuals of a taxa per square foot of stream bottom. In these data refinements, an adjustment for the duplicate field collections was made if necessary through an appropriate division, and an adjustment for laboratory subsampling was also made as required through the further application of a multiplication step. For the artificial substrates, the data are presented as the numbers of taxa individuals collected from the duplicate samplers that were exposed at each of the station's stream locations for each of the exposure periods. Mathematical adjustments for laboratory subsampling were made as needed in this case also.

Reference Collection and Taxonomic Identifications. Through the entire process of sorting and identifying the different macroinvertebrate samples, a few individuals of the different taxa were selected from among the many inventory samples for placement into the project's macroinvertebrate reference collection. The taxonomic identifications of these reference specimens and the sample individuals were made using the macroinvertebrate keys that are available in the reference materials chosen for the study, e.g., Merritt and Cummins (1978) for the insect families, Edmunds, et al (1976) for the mayfly genera (Ephemeroptera), Wiggens (1977) for the caddisflies (Trichoptera), Roemhild (1975) for the damselflies (Zygotera), Klemm (1972) for the leeches (Hirudinea), and so on. Specific reference specimens were selected from the many taxa individuals that were available to best illustrate the critical taxonomic features of the particular macroinvertebrate group. The taxonomic identifications of these organisms were taken to the lowest systematic level possible in relation to the information that is presented in the keys, in relation to the expertise of the project workers and their associates, and in relation to the time constraints that were imposed upon the inventory. As stated in the first research proposal (Klarich, 1977), it ". . . is not proposed . . .to spend a great deal of time with the identification of taxonomically difficult forms . . .," and this precept has been followed throughout the macroinvertebrate segment of the study. The reference collection that was developed during the project is being stored in a preserved condition in labelled (taxa and sample information), airtight vials, and it has been used to make the taxonomic verifications that were initiated during this study. In addition, this collection is also available for perusal by any interested parties, and it will be on hand for any future verfications if this need should happen to arise.

Biomass Assessments. As a final step in the laboratory analysis of these macroinvertebrate samples, the preserved individuals stored in each of the taxa petri dishes were used as the basis of a biomass assessment for the different samples collected during the project. The individuals stored in each of the dishes were recounted and then transferred to tared weighing boats where they were air-dried for a period of 24 to 48 hours depending upon their size and numbers. After the drying period, the organisms were weighed two times between three and four hours apart using a Mettle balance. If the second weighing equalled the first, then

this number minus the tare was taken as the dry weight or the biomass expression of that taxa for that site and date. However, if the weights happen to decrease from the first to the second weighing, then this application was continued at suitable intervals until a stability was achieved as the final observation.

All of the taxa of a collection showing relatively large numbers of individuals were directly weighed in this fashion. Thus, a major fraction of the macroinvertebrate biomass of a sample was directly measured in the study. However, many of the taxa had only a relatively few number of individuals, and accurate and direct weight determinations in these cases were found to be very time-consuming and quite difficult for some types of organisms. Therefore, total dry weights for most of the scarcer taxa in a sample were estimated from weight per individual data that were available from other samples which had a larger number of individuals for this same macroinvertebrate group. Such directly measured or estimated weight data were then eventually developed into a final biomass expression for each taxa of a sample and for the sample in total as follows: milligrams of air-dried weight per square foot of stream bottom for the Surber applications, and milligrams of air-dried weight per duplicate samplers for the artificial substrate collections.

PHYSICAL MEASUREMENTS

Appropriate physical measurements were taken at the various stream stations in conjunction with all of the Surber macroinvertebrate and artificial substrate work. Current velocity was measured in feet per second using a standard pygmy flow meter attached to a graduated, top-setting wading rod. This assembly was placed in the stream at the spot of the Surber collection or at the location of the jumbo multiplate samplers for the timed current evaluation, and depth in tenths of a foot was then obtained from the rod. Current speed was measured at six-tenths of the depth below the surface (Environmental Protection Agency, 1973). Stream width in feet was also measured in this same vicinity perpendicular to the main thread of current, and either the wading rod or a tape was used for this determination depending upon the breadth of the water. Such width measurements were made during the inventory primarily as a means of characterizing one aspect of stream size at the different sampling sites, although these same data were also utilized in developing the study's flow estimates.

If these first current velocity, depth, and width measurements at a station appeared to be fairly representative of the stream segment, then these data were used to obtain a rough estimate of flow in cubic feet per second. But if the initial physical measurements at the selected sampling location did not appear to afford a very good estimate of the average values that might be obtained for the reach, then a few supplemental measurements at more appropriate spots in the stream were taken to provide a better basis for making a guess at its flow. Because of field time restraints, it should be stressed that no attempts were made to formally and accurately gage the streams following USGS procedures, and flows were estimated by simply multiplying the average width, depth, and velocity numbers. Some of the discharge data available to the inventory, particularly for the larger streams, was obtained from

published USGS (1979b) records, but since this agency did not monitor many of the smaller creeks that were sampled during this inventory, a flow estimating procedure, as described above,was instituted for the project as a means of quickly securing this type of information for the non-USGS waters. It was then applied to most of study area streams, as feasible, for the purposes of data consistency. The main point of gathering flow information for the project was to provide another type of stream size characterization for the different waters of the southern Fort Union region, and in this light, an extreme gaging accuracy was not thought to be necessary for the objectives of the investigation.

In the case of the artificial substrate applications, the current velocity, depth, width, and flow evaluations were generally first taken when the duplicate samplers were initially introduced to a stream location, or shortly thereafter, and also at the time that the samplers were later removed from the water to terminate an exposure run. An average of the two measurements for each physical variable was then assumed to represent a fairly accurate picture of the overall influences of these factors on the organisms that were housed by the samplers through the exposure period.

STREAM SUBSTRATE EVALUATIONS

In addition to the current velocity and depth factors, the nature of the stream substrate or bottom materials represents another physical variable that can have an effect on the benthic biota of lotic systems. Therefore, an attempt was made in this inventory to develop some type of representation for the substrate aspect of the streams that could be used in relation to the Surber biotic data for interpretive purposes. Since the application of quantitative evaluations of this kind could not be made during the inventory because of time restrictions, a qualitative approach was used to obtain the requisite substrate information.

The substrate classification system that was adopted for this inventory is summarized in Table 5 as a slight modification of the system presented by the Environmental Protection Agency (1973) in their biological reference manual. The detritus category of the table consists of the plant debris and macroalgae that might be associated with a collection. As indicated in the table, reference numbers between one and eight were assigned to each of the eight substrate categories so that the increasing magnitude of this number corresponds to an increasing size of the substrate materials. However, the variable detritus class was somewhat arbitrarily assigned to the number four position for the sake of convenience.

In the actual application of this classification system to the substrate evaluations, the percent relative abundance of each substrate category associated with a Surber sample is first estimated qualitatively in the field and then in the laboratory. Through a subsequent weighting (multiplication) of the appropriate category reference number with this abundance percentage as a decimal, a single or summary reference number ranging between one and eight can be calculated for a sample by summing the weighted values of the different categories. This summary number, in turn, provides a general description of the overall substrate

Table 5. Stream substrate classification system used in conjunction with the Surber macroinvertebrate collections.

Reference Number	Type of Substrate	Median Substrate Diameter	Range of Substrate Size
1	Clay, muck, and silt	0.03mm	<.05mm
2	Fine sand	0.15mm	0.05mm to 0.3mm
3	Coarse sand	1mm	0.3mm to 2mm
4	Detritus	variable	variable
5	Fine gravel	0.6cm	0.2cm to 1cm
6	Medium gravel	2cm	1cm to 3cm
7	Coarse gravel	5cm	3cm to 6cm
8	Rocks, rubble, and boulders	16cm	<6cm

characteristics of an analyzed stream segment such as a Surber sampling location. Summary numbers closer to eight are suggestive of a high proportion of the larger substrate materials like the boulders and the coarse gravels, and these higher numbers are probably most commonly obtained from the riffle sections of a stream. In contrast, the smaller summary numbers closer to one point to a high proportion of the finer substrate particles such as the silts and clays, and these numbers are probably most typically associated with the ponded segments having low current velocities. In response, different types of benthic macroinvertebrate associations might be anticipated for these two situations.

In addition to the use of the summary substrate reference numbers for the biotic correlations, the percentage values of the individual substrate categories *per se* might also have some interpretive applications. For example, a collection high in detritus might contain a different assortment of aquatic organisms than a sample with a similar summary number that is comparatively low in this same category. In any event, these kinds of data along with the summary numbers are also available for use in the assessment phase of the project.

Two steps were involved in obtaining the requisite category abundance percentages. First, the percentages of the broader substrate classes such as the sands and gravels were estimated and noted in the field as a component of the on-site habitat descriptions that were completed as a part of the inventory. Afterward, the smaller substrate materials that were transported to the laboratory as a portion of the Surber collections were again examined following the biological analyses for a further refinement of these percentage values. Although this type of qualitative substrate evaluation is probably not as valid as the application of a quantitative assessment, it is still felt that a fairly representative picture of the study area streams' substrate characteristics was obtained for the study in relation to the time expended through the use of the above described methodology.

PERIPHYTON AND MACROALGAE

Field sampling for the periphyton and the macroalgae phases of the inventory was much more straightforward and simple than the effort that had to be applied to the macroinvertebrates. The essence of this work has been described previously in this report, and the scrapings that were taken from both the natural and artificial substrates were transferred to small vials and preserved with Lugols (IKI) solution for transport and storage. In the case of the natural substrates, a number of submerged objects from various nearby locations at a sampling site were scraped in order to afford a replicate, in minature, of the entire periphyton community within that stream section. Furthermore, conspicuous macroalgae within the same stream vicinity were separately "picked" in proportion to their abundance and added to the same bottle. In a few instances, such collections involved only macroalgae to the exclusion of the diatoms that were attached to the bottom materials of the stream.

In the laboratory, sample evaluation first involved a vigorous agitation of the sample bottle to initiate a complete mixing of its contents. This action, in turn, resulted in a randomization of the collection, and it also dislodged any of the diatoms that might have been attached to the macroalgae in the sample. Other applications were then required, and the next seven steps of the analytical procedure will be earmarked with roman numerals in the below discussion for later reference purposes.

Following sample agitation, the subsequent three steps in the analysis of the algae collections were directed to the soft-bodied or the non-diatom forms as follows: I. The obvious soft-bodied algae were removed from the sample bottle, examined with a microscope, and identified to genus using the appropriate reference keys, e.g., Smith (1950). II. Subsequently, a small subsample was pipetted from the bottle onto a microscope slide and scanned under magnification until a majority of the smaller non-diatom algae had been located and identified. III. These soft-bodied algae at the generic level and the diatoms at the class level (Bacillariophyceae) were then ranked on the basis of their abundance in the sample with a rank of one being assigned to the most plentiful taxa. Furthermore, qualitative estimates of abundance on the basis of volume were also made in addition to the rankings by using "very abundant," "abundant," "very common," "common," and "rare" designations in relation to each of the algal taxa. These abundance descriptions then completed the assessment of the non-diatom groups, and further attention was directed entirely to the diatomaceous component of the sample.

The fourth step (IV) of the periphyton analysis required the preparation of permanent microscope slide mounts utilizing the remaining contents of the sample bottle. The techniques outlined in Standard Methods (APHA, et al, 1975) for slide preparation were followed in this inventory, and the resultant slides now comprise the diatom reference collection of the project. A subsequent phase of the algae assessment (V) involved a microscopic survey of these same slides with the diatom algae found on the mounts identified taxonomically to the varietal level. This was followed by the completion of proportional counts of the individuals of

each of the diatom species until between 300 to 400 total cells per slide-sample had been tabulated. Procedures described by the Environmental Protection Agency (1973) were utilized for making the counts. In the case of a few depaupered samples having a relatively low number of diatom individuals, only 100 to 200 cells were identified and tabulated because of the associated time restrictions involved in finding the remaining cells on the mount.

The major data output for the periphytic portion of the inventory resides in the percent relative abundance (PRA) values for the different diatom species that were counted on a slide-sample, and these PRA numbers were calculated as one of the final steps of the algae assessment (VI). A PRA is defined as the count obtained for a particular diatom taxa divided by the total number of diatom cells tabulated for the mount, and the total PRA of a collection should then be equal to 100%. As the last step of the analyses (VII), sample diversity and equitability as described by Lloyd, et al (1968) and by Lloyd and Ghelardi (1964), respectively, were eventually calculated from the PRA data for further interpretive and comparative purposes.

Five classes of periphyton community-macroalgae samples were collected from the study area streams as described in Table 2 (samples A to E). The A-type of sample, involving a complete analysis of the algae components through step VII, was obtained from all of the waters of the inventory; however, this A class was most consistently assessed from the intensive station collections as noted in the table. At least one A sample was evaluated for each of the accessory and miscellaneous sites, and these collections were most commonly obtained during a mid-summer period when algal diversity was at its highest in the streams. In the case of the B samples, the soft-bodied algae were analyzed through step III but with the analysis stopping after the completion of step IV. Thus, permanent mounts are available for all of the B samples as a part of the project's diatom reference collection. Most of the samples from the accessory stations are of the B class, and although slides for these collections are on hand, they were not processed for the diatoms because of study time restrictions related to a complete processing of the more important A samples from the intensive sites. The slides from the accessory B samples can also be analyzed to completion or to the A level at some time in the future if funding opportunities happen to arise, and these additional assessments will further enhance the periphytic data base for the study region waters.

In contrast to the A- and the B-types of algae samples, the C collections were obtained only for an evaluation of the macroalgae with no options for assessing the diatomaceous forms. Their analysis was thereby terminated after the completion of step III with no permanent mounts prepared for the collection. Samples of this kind were obtained from a variety of study area streams as new algal growths happened to appear through the field seasons, but the C class was most commonly collected from the intensive streams. The main point of the C effort was to enhance the inventory's taxonomic, distributional, and abundance information for the non-diatom algae.

Like the A samples, the D and E collections were also completely analyzed through step VII, and the major differences between the A and the D-E classes relate to the higher number of counts in the D case over

the A and to the use of artificial rather than natural substrates in the case of the E-type samples. The similarities between these three types of samples can be summarized as follows: Diatom counting intensity was generally the same for the A and E samples while natural substrates were scraped to obtain both the A and D collections. In addition, and with only one exception (Indian Creek near Kirby for the D series), the D and E samples were obtained only from the nine intensive stations and not from any of the accessory sites.

A single D-type sample was obtained from each of the intensive sites and from Indian Creek, and they were collected during the mid-summer in conjunction with the high algal diversities. In addition to increasing the algal data pool of the project, another purpose for obtaining the D samples and the high counting intensities was to provide an in-depth look at the structure of streams' periphyton communities in the hope that this will afford a future opportunity to complete rigorous statistical comparisons between time-different periphyton samples obtained from the same stream locations during the same season in order to spot any changes in water quality that might have occurred during the intervening years. Furthermore, such an in-depth look at the streams' algal communities is of scientific interest in its own right.

Several of the E-type samples were obtained from each of the intensive stations, and these were collected from the artificial substrates or plexiglass plates that had been exposed in the stream for a period greater than one month. These six inch by nine inch plates were suspended in the stream through the use of wooden stakes that were pounded into the stream bottom, and the plates were then attached to the stakes through the use of U-bolts that were passed through holes appropriately drilled in the plexiglass. With the use of this system, the plates were vertically positioned in the stream so that the top, 1/4 inch wide edge of the plate was located at or slightly below the surface of the water. The artificial substrates were placed in a fairly deep segment of the stream, and a spot was chosen that had a low to moderate current velocity. This stream location, therefore, is generally equivalent to the riffle to pool, transition zone described previously for the artificial substrate, macroinvertebrate work.

A major reason for making an artificial substrate application to the algal phase of the project was to compare the older periphyton communities obtained from the natural substrates to the younger communities that had recently colonized the plates. In addition, these artificial substrate collections act to supplement the taxa listings of the project, and they also enhance the rank, abundance and frequency data for the different algae that inhabit the study area streams. This includes the macroalgae as well as the diatoms since the soft-bodied forms can also grow on the plates. Furthermore, since the plexiglass plates afford a well-defined substrate for the algae, the data from this segment of the project should be quite conducive to making various physical-water quality and biological statistical correlations because of the somewhat controlled circumstances in this application with a smaller number of non-biotic factors affecting the communities. Statistical applications of this kind should thereby be somewhat more straightforward and easier to interpret through the use of artificial substrates than the case with the natural bottom materials.

APPENDIX

TABULAR CONSIDERATIONS

General Features. All of the water quality data collected as a part of this inventory are summarized in the appendix of this report. Similarly, most of the biological data are also tabulated with one major exception. This exception resides with the periphytic phase of the project where the PRA values that were obtained for a major portion of the diatom species of each collection have not been presented. With the obtainment of around 42 bacillariophycean taxa per sample, and with the obtainment of upwards to about 60 different taxa per sampling site for all of the station collections, the complete and formal tabulation of all of this algal information would have been an overwhelming and voluminous task. As a result, only the PRA's of the dominant diatom species of each sample are listed with dominance defined as a PRA value in excess of 9.9%. However, complete listings of the many PRA numbers for each of the analyzed periphyton samples collected from the study area streams are on file with the Water Quality Bureau office in Helena, Montana, and these data sheets are available for perusal.

A major part of the physical data obtained during the macroinvertebrate segment of the inventory is also presented in this appendix. As one exception in this regard, the physical measurements associated with the initial introduction of the jumbo samplers to the streams and with their subsequent removal have not been presented in favor of the tabulation of a mean value. This elimination was necessary because of space restrictions in the associated tables. In addition, only the single summary reference number that describes the substrate features of a Surber collection are listed in these same tables. The substrate category percentages relative to Table 5 have not been included because of the space requirement for a listing of 1528 members of this kind. But again, the substrate category percentages describing each Surber sample are on file with the Water Quality Bureau.

Except for the water quality tabulations, the Surber physical measurements, and the qualitative estimates of macroalgae and diatom abundance, and with the exception of some of the periphyton information (total diatom taxa and taxa counted and total diatom cells counted), the data that are presented in this appendix are best described as "semi-raw" in nature since some refinements have been applied to the "raw" numbers before their entry into the tables. Such data refinements can be summarized as follows: (1) Adjustments of the actual counts of the macroinvertebrate taxa individuals in a sample for the occurrence of duplicate-triplicate sampling on a station visit and/or for the occurrence of subsampling in the laboratory, and this then led to the density, taxa numbers, and biomass expressions that are presented for the Surber and jumbo multiplate collections; the taxa means for a station and the sample totals are also listed. (2) Determinations of mean current velocity, stream width, and stream depth from the initial and final values that were measured in association with the macroinvertebrate artificial substrate work. (3) Calculations of single summary substrate reference numbers from the category percentage estimates that were made in conjunction with the Surber collections. (4) Calculations of PRA values from the cell counts of the diatom species that were identified in a periphyton sample, and (5) determinations of sample diversity and equitability from the PRA data

of a periphyton collection. These "raw" and "semi-raw" data will be additionally refined and reduced as appropriate for interpretive considerations in the other two final and companion reports of the project.

The "raw" and "semi-raw" physical, water quality, and biological data that are now on hand for the coalfield area streams as a result of this recent inventory effort are presented in this report as a series of tables generally organized on the basis of sampling station and collection date. These tabular series can be described as follows: Series A--water quality data tables; Series C--Surber macroinvertebrate density tables (numbers of taxa individuals, sample totals, and taxa means per square foot of stream bottom); Series D--artificial substrate macroinvertebrate tables (numbers of taxa individuals, sample totals, and taxa means per duplicate jumbo multiplate samplers); Series E--Surber macroinvertebrate biomass tables (milligrams of air dry weight for each taxa, sample totals and taxa means per square foot of stream bottom); Series F--artificial substrate, macroinvertebrate biomass tables (milligrams of air dry weight for each taxa, sample totals, and taxa means per duplicate jumbo multiplate samplers); Series G--physical measurements that were taken in conjunction with the macroinvertebrate work; Series I--macroalgae and bacillariophycean abundance rankings and estimates, PRA's of major diatom species, and periphytic community information that were obtained from natural stream substrates; Series J--macroalgae and bacillariophycean abundance rankings and estimates, PRA's of major diatom species, and periphytic community information that were garnered from artificial substrates exposed to the streams; and Series L--examples of a complete floristic periphyton sample analysis.

In addition to these series tabulations, Table B34 of the appendix presents a listing of the macroinvertebrate taxa collected from the study area waters during the inventory, plus some other descriptive information, and Tables H137 and K171 make a similar presentation for the periphytic and macroalgal segment of the project. Certain details of these three summary tables plus those within each of the above mentioned tabular series are discussed below.

Water Quality. The water quality data collected during the project are presented in Tables A01 to A33. The symbols used in these tables for the different water quality parameters are defined in Table 4 of the text. The data are presented in the units of milligrams per liter (mg/l) whenever appropriate--TSS, DO, BOD, common ions, nitrogen and phosphorous nutrients, metals, and silica, and the concentrations of the nutrients are given as mg/l of the nutrient element, i.e., as mg P/l or as mg N/l. Other concentrational units and related notes can be listed as follows: Temp in degrees centigrade (C), pH in standard units, SC in micromhos per centimeter at 25C, Turb in nephelometric turbidity units (NTU), TC as the number of colony counts per 100 ml, TH as mg $CaCO_3$/l, and TA as mg $CaCO_3$/l. The "N" in the TlN column of the tables denotes a "nearly equal to" or "about equal to" value in those cases where ammonia or nitrite-nitrate concentrations were below detectable limits.

These same water quality tables also contain the geographic descriptions of the sampling locations for each of the water quality (and biological) collections. The "a" designations denote the most frequently sampled segment, the "b" designations denote the next most frequently sampled segment, and so on. The symoptic run notations point to the collection of water quality (and biological) samples at a number of sequential stations along the length of two selected streams within a short period of time.

Macroinvertebrates. The macroinvertebrate section of the appendix data tables is initiated with a summary taxa listing of all of the macroinvertebrates collected during the investigation (Table B34). The common names for these taxa are also listed as available. The taxa identifications presented in this table were taken to the lowest systematic level possible in relation to the objectives and theme of the study and in relation to the expertise that was immediately available to the project and its time restrictions. Thus, identifications to genera were feasible in many instances, and species identifications were possible for a few of the organisms. In all cases, only those taxonomic identifications that were felt to be fairly secure at a particular systematic level are listed, and the unreasonable "forcing" of these identifications to lower systematic categories in light of the information that was on hand was avoided throughout the inventory. Verifications of many of the organisms have been obtained from various non-project individuals that are also working in the aquatic macroinvertebrate field, and any identifications that are still felt to be somewhat tentative are noted as such in the data tables.

Some of the macroinvertebrates could only be identified to a higher taxa above the generic level because of the difficulty in keying certain of the ambiguous forms such as the chironomids, oligochaetes, flatworms, and nematodes, and because of the lack of suitable keys. Further identifications of these kinds of organisms would ultimately require the efforts of expert taxonomists in a particular macroinvertebrate group, or an excessive expenditure of project time, and both of these requirements were beyond the tenants of the study. In other cases, generic identifications could not be made because of the small size of the specimens or because of their inadvertent mutilation during field collection and sample processing, and both of these factors resulted in an obscuring of critical taxonomic characteristics. For whatever reason, the identifications that had to be stopped at a higher systematic level are noted in Table B34.

In addition to the taxa list per se, the systematic features of the organisms are also included in Table B34 along with a few accessory notes describing their significant habits and characteristics. This information was taken from a variety of reference sources as follows: Pennak (1978), Merrit and Cummins (1978), Burch (1972), Klemm (1972), and Edmondson (1958). These same sources also list various common macroinvertebrate taxa that are typically found in aquatic systems but for which no specimens were obtained from the study area streams under the sampling regime of the project. These uncollected taxa are also indicated in the table.

The macroinvertebrate data tables (Tables C35 to F134) are organized on the basis of higher taxa levels such as order, class, or phyla. They generally copy the sequence of taxa presented in Table B34, and the symbols that are used for the higher taxa markers in the data tables are defined in this initial summary. Some geographic descriptions are also included for those cases where more than one sample was collected from a broadly defined station in a single day. For the remaining collections, the sampling date can be used to find the appropriate geographic description in the water quality tables.

The "t" designations in Tables C35 to F134 denote a tentative taxonomic identification while the "p" notations indicate the presence of a particular taxa at a sampling station although intact individuals could not be found in the sample. That is, the presence of these taxa was

intimated by the occurrence of accessory evidence in the collection such as empty shells, cases, or exoskeletons, but these fragments were not counted as a part of the data tabulations. The "A," "L," and "P" symbols in the tables describe the collection of adult, larval, and pupal stages respectively. For the rest of the insect taxa that lack these designations, the larval forms were collected, and adults were generally obtained in the case of the non-insect taxa.

Physical Measurements and Substrate. Table G135 presents the physical data that were taken in association with the Surber macroinvertebrate samples, and this same table also contains the summary substrate reference numbers that were calculated for each of these collections. In addition, a few related notes describing the general stream habitat that was utilized for the collection and the condition of the stream at the time of sampling are also included. The riffle references in these notes refer to a relatively shallow section having a distinct gradiant and a fairly rapid current velocity so that a distinct turbulent flow was evident over the stream's bottom materials. The channel segments, in contrast, although also possessing a marked current, did not demonstrate as pronounced a turbulent flow as the riffle reaches, and they therefore appeared to be much smoother in character. As a further item in Table G135, a listing of the extraneous visits to the different stations is presented with associated comments summarizing the reasons why Surber samples coult not be collected on these particular dates.

As a sister tabulation, Table G136 presents the physical data obtained in conjunction with the jumbo multiplate samplers. Notes are also included in this table on the occurrence of sampler loss during the study period, and a listing of the various miscellaneous site visits that were made in conjunction with the artificial substrate work is also included to help elucidate the general sampling schedule for this phase of the inventory.

Periphyton and Macroalgae. The periphyton portion of the appendix tables is prefaced with a summary listing of the major algal taxa, both the diatoms and the soft-bodied forms, that were collected during the course of the study (Table H137). As indicated in this table, the diatoms were identified to species (and to variety as feasible) while the non-diatoms could only be taken to the generic level. Common names are also included as they happen to be available for the different taxa. In addition, the systematics of these algae are presented along with a few notes describing some of their major characteristics. Such descriptions represent an amalgamation of the information that is contained in the following reference sources: Robbins, et al (1965), Round (1965), Wiesz and Fuller (1962), and Smith (1950). In general, most of the descriptive features contained in the table for the algal taxa were specifically chosen from among a large number of such characteristics so that they might serve to distinguish only the algal forms that were collected as a part of this inventory. Therefore, the information in Table H137 should not be viewed as a key that would be helpful in identifying algal taxa outside of the study area, or useful in keying an unlisted and unidentified taxa that might still be collected from the project region.

Tables I138 to J170 contain the periphytic and macroalgae data that were collected during the project. The abundance rankings of the soft-bodied algae and the Bacillariophyceae are included as well as their class abundance estimates using the very abundant (VA), abundant (A),

very common (VC), common (C), and rare (R) designations described previously. The dominant diatom taxa and the associated PRA values are also listed along with various types of data describing the nature of the periphyton community in each collection. Summed PRA numbers for the Achnanthes spp. and Nitzschia spp. are presented because of the importance of these two genera as water quality indicators (Lowe, 1974).

Tables I138 to I165 contain the periphytic and macroalgae data that were collected from the natural substrates of the streams, and Tables J166 to J170 contain similar data that were obtained from the plexiglass plates. The sample codes listed in these tables are defined in Table 2 of the text, and the sample number of each collection pertains to a labelling system that is used by the Water Quality Bureau to provide easy access to the permanent mounts that form a part of the Bureau's diatom reference assemblage.

Table K171 in the appendix acts as an extension of the initial algal summary table where all of the diatom taxa identified in the analyzed project periphyton samples are listed. Authoritative, varietal, and form names associated with each diatom species are also included in the same table. This diatom species list is termed tentative at the present time since the opportunity for future taxonomic work on the collections will probably result in verifications or nomenclatural alterations of some of the questionable identifications, and this work could also eventually result in the identification of some of the currently unknown taxa. Furthermore, it is felt that new diatom species might be found in the coalfield area periphyton collections with the continuation of taxonomic work in this direction.

The final three tables in the appendix of this report (Tables L172 to L174) provide examples of the taxa listings and related PRA values that were obtained from a standard floristic evaluation of the study area algal samples. Data obtained from seven intensive sites collected on two different dates were chosen for this presentation. The listings are organized on the basis of "major," "sub-major," and "minor," species as defined in the tables, although this format was not meant to have any significant interpretive value; rather, it was formulated simply as a convenient way to arrange the species names and numbers. The trace amounts (tr) noted in these tables for some of the diatoms refer to those species in a sample that were spotted during the microscopic scans of the permanent mounts while never being actually counted during the tabulation process.

DATA TABLES

The many data tables that were developed as a result of the southern Fort Union region biological-benthic inventory are presented on the following pages of this data report. A complete listing of these tables is included in the "List of Tables and Figure" section located at the front of this publication.

Table A01. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Upper Rosebud Creek near Kirby (Intensive Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
06/16/78b	16.0	8.30	890	6.8	--	9.2	--	--	--	--	--	--	--	--	--	--	--	--	--
06/29/78a	20.0	8.20	888	19.	58.1	7.6	--	--	492	84.8	68.1	20.4	359	438	0.0	2.4	178	0.56	792
07/18/78a	19.8	8.37	882	12.	--	9.1	1.0	--	--	--	--	--	--	--	--	--	--	--	--
08/03/78a	15.0	8.30	818	11.	21.2	--	--	--	484	77.0	70.8	19.9	362	441	0.0	2.5	165	0.56	777
08/18/78a	14.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/29/78a	15.2	8.22	868	4.0	13.1	8.9	--	--	475	79.6	67.1	22.3	367	447	0.0	3.0	124	0.71	744
09/05/78a	18.2	8.23	850	14.	26.0	8.4	--	--	--	--	--	--	--	--	--	--	--	--	--
09/08/78a	17.6	8.22	830	9.0	19.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/08/78a	7.9	8.28	938	8.6	20.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/05/78a	3.7	8.28	950	9.3	17.0	11.3	1.7	2000	528	90.0	73.7	24.0	408	498	0.0	3.2	154	0.60	844
04/01/79a	1.7	8.20	827	39.	126.	11.4	--	--	448	80.4	60.1	17.8	312	381	0.0	2.5	165	0.39	707
05/20/79a	12.9	8.28	721	17.	51.2	9.3	1.4	--	456	81.3	61.4	17.2	330	402	0.0	2.5	156	0.52	721
06/21/79c	18.0	8.29	868	12.	31.0	9.1	--	--	--	--	--	--	--	--	--	--	--	--	--
07/27/79a	19.3	8.28	900	16.	36.9	9.6	--	--	--	--	--	--	--	--	--	--	--	--	--
08/08/79a	19.4	8.32	897	7.9	22.5	9.0	--	--	--	--	--	--	--	--	--	--	--	--	--
08/17/79a	18.8	8.34	893	9.8	27.1	9.8	--	--	--	--	--	--	--	--	--	--	--	--	--
09/05/79a	17.4	8.30	868	12.	23.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/15/79a	12.5	8.18	870	9.0	19.8	10.0	2.5	--	--	--	--	--	--	--	--	--	--	--	--
09/28/79a	11.7	8.20	865	16.	30.0	8.4	3.4	--	--	--	--	--	--	--	--	--	--	--	--
10/18/79a	9.6	8.20	905	18.	32.4	9.4	1.9	140	--	--	--	--	--	--	--	--	--	--	--
11/01/79a	2.1	8.25	932	7.7	10.2	12.6	2.4	--	--	--	--	--	--	--	--	--	--	--	--
11/06/79a	3.2	8.29	945	17.	29.4	11.9	2.2	420	--	--	--	--	--	--	--	--	--	--	--

Sampling Locations: a--T06S,R39E,20C; b--T06S,R39E,32A; c--T06S,R39E,29B.

Table A02. Water Quality Analyses Completed by DHES: Nutrients and Metals--Upper Rosebud Creek near Kirby (Intensive Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
06/16/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/29/78a	0.015	0.099	0.16	0.05	0.21	--	0.83	0.11	0.01	<.005	<.001	<.005	0.006	<.0002	--
07/18/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/03/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/78a	0.007	0.037	0.07	0.02	0.09	--	--	--	--	--	--	--	--	--	--
08/29/78a	0.004	0.02	0.05	0.03	0.08	--	0.30	0.55	<.01	<.005	<.001	<.005	<.005	<.0002	--
09/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/08/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/08/78a	0.007	0.03	0.02	0.01	0.03	--	--	--	--	--	--	--	--	--	--
11/05/78a	0.007	0.03	0.04	0.01	0.05	--	0.31	0.06	<.01	<.005	0.001	<.005	<.01	<.0002	--
04/01/79a	0.010	0.12	0.34	0.01	0.35	--	--	--	--	--	--	--	--	--	--
05/20/79a	0.017	0.06	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
06/21/79c	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/27/79a	0.027	0.05	0.05	<.01	N.05	--	--	--	--	--	--	--	--	--	--
08/08/79a	0.022	0.04	0.03	0.02	0.05	--	--	--	--	--	--	--	--	--	--
08/17/79a	0.017	0.04	0.02	0.01	0.03	--	--	--	--	--	--	--	--	--	--
09/05/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/15/79a	0.020	0.05	0.02	0.01	0.03	--	--	--	--	--	--	--	--	--	--
09/28/79a	0.012	0.05	0.02	0.01	0.03	0.50	--	--	--	--	--	--	--	--	--
10/18/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/01/79a	0.016	0.03	0.02	<.01	N.02	0.26	--	--	--	--	--	--	--	--	20.0
11/06/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17.0

Sampling Locations: a--T06S,R39E,20C;b--T06S,R39E,32A; c--T06S,R39E,29B.

Table AO3. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Middle Rosebud Creek near Colstrip and Lower Rosebud Creek near Rosebud (Accessory Stations); Indian Creek near Kirby (Accessory Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Middle Rosebud Creek near Colstrip																			
07/12/78a	21.0	8.18	1215	190.	--	7.4	--	--	--	--	--	--	--	--	--	--	--	--	--
08/22/78a	20.0	8.40	1260	56.	108.	8.7	4.8	--	597	66.4	105.	82.0	388	461	6.0	4.5	380	0.58	1105
08/24/78b	17.5	8.39	1215	40.	75.8	--	--	--	580	64.8	102.	73.0	384	458	4.8	4.2	333	0.58	1040
05/20/79a	16.3	8.20	1095	200.	502.	--	--	--	548	77.6	86.0	52.0	363	442	0.0	4.0	285	0.52	947
07/03/79a	21.0	8.28	1175	150.	323.	8.2	--	--	559	68.9	94.0	71.0	364	429	7.2	5.6	314	0.57	991
08/24/79c	--	8.44	1249	67.	127.	9.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Sampling Locations: a--T01N,R43E,19A; b--T01S,R42E,08A; c--T01N,R42E,25A.																			
Lower Rosebud Creek near Rosebud																			
08/23/78c	20.8	8.45	1400	85.	164.	--	--	--	618	65.2	111.	103.	391	460	8.4	5.0	441	0.60	1194
08/23/78a	21.9	8.42	1445	53.	102.	--	--	--	617	63.2	112.	133.	389	460	7.0	5.5	481	0.60	1262
05/20/79d	16.0	8.23	1125	220.	528.	--	--	--	561	78.4	88.6	59.0	362	442	0.0	4.0	312	0.53	984
06/13/79b	21.8	8.25	1280	190.	413.	8.9	3.3	--	--	--	--	--	--	--	--	--	--	--	--
11/07/79a	3.3	8.50	1455	21.	33.4	12.8	--	50	--	--	--	--	--	--	--	--	--	--	--
Sampling Locations: a--T06N,R42E,16D; b--T06N,R42E,21A; c--T05N,R42E,08D; d--T04N,R43E,30C																			
Indian Creek near Kirby																			
07/25/78a	19.5	8.19	690	11.	67.4	7.7	2.2	--	375	69.6	48.9	12.8	321	392	0.0	2.4	69.2	0.58	595
08/24/78a	19.0	8.40	662	2.0	4.0	8.7	2.2	--	371	68.0	48.9	12.8	306	359	6.7	2.4	70.0	0.64	569
08/29/78a	13.0	8.28	688	7.5	18.0	--	--	--	380	76.8	45.7	13.0	312	381	0.0	2.5	67.0	0.64	587
11/05/78a	4.9	8.30	718	3.0	4.2	--	--	--	403	84.8	46.5	13.7	344	420	0.0	2.8	77.2	0.64	646
06/26/79a	20.2	8.36	650	7.8	19.2	8.3	--	--	362	62.1	50.2	11.5	300	351	7.2	2.6	83.0	0.60	569
07/17/79b	21.2	8.39	670	1.6	2.9	9.1	--	--	342	62.7	45.0	11.7	290	340	6.7	2.3	81.1	0.58	550
08/08/79b	21.9	8.21	662	0.8	2.9	8.0	--	--	357	61.6	49.4	12.2	287	350	0.0	23.0	78.2	0.60	575
09/28/79a	10.6	8.22	728	4.5	6.4	8.9	2.2	--	403	67.2	57.1	16.7	334	408	0.0	2.7	93.4	0.66	645
11/06/79a	3.8	7.70	690	2.0	14.6	11.5	1.8	110	--	--	--	15.8	308	376	0.0	2.9	99.2	0.58	--
Sampling Locations: a--T06S,R39E,31D; b--T06S,R39E,31C.																			

Table A04. Water Quality Analyses Completed by DHES: Nutrients and Metals--Middle Rosebud Creek near Colstrip and Lower Rosebud Creek near Rosebud (Accessory Stations); Indian Creek near Kirby (Accessory Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Middle Rosebud Creek near Colstrip															
07/12/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/22/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/78b	0.009	0.052	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
05/20/79a	--	--	--	--	--	--	0.12	--	--	--	--	--	--	--	--
07/03/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/79c	0.052	0.05	0.02	0.03	0.05	--	--	--	--	--	--	--	--	--	--
Sampling Locations: a--T01N,R43E,19A; b--T01S,R42E,08A; c--T01N,R42E,25A.															
Lower Rosebud Creek near Rosebud															
08/23/78c	0.010	0.095	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
08/23/78a	0.008	0.078	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
05/20/79d	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/13/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/07/79a	0.015	0.04	<.01	<.01	<.02	0.38	--	--	--	--	--	--	--	--	12.0
Sampling Locations: a--T06N,R42E,16D; b--T06N,R42E,21A; c--T05N,R42E,08D; d--T04N,R43E,30C.															
Indian Creek near Kirby															
07/25/78a	0.023	0.064	0.08	0.02	0.10	--	0.59	0.095	<.01	<.005	<.001	0.008	<.005	<.0002	--
08/24/78a	0.010	0.017	0.04	0.01	0.05	--	0.14	0.025	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/29/78a	0.008	0.04	0.06	0.03	0.09	--	0.33	0.041	<.01	<.005	<.001	<.005	<.005	<.0002	--
11/05/78a	--	--	--	--	--	--	0.08	0.019	<.01	<.005	<.001	<.005	<.01	<.0002	--
06/26/79a	0.027	0.04	0.07	<.01	N.07	--	0.35	0.065	<.01	<.005	<.001	<.005	<.005	<.0002	--
07/17/79b	0.007	0.02	<.01	0.05	N.05	--	0.17	0.050	<.01	<.005	<.001	<.005	0.005	<.0002	--
08/08/79b	0.005	0.03	<.01	0.03	N.03	--	0.09	0.030	<.01	<.005	<.001	<.005	<.005	<.0002	--
09/28/79a	0.013	0.02	0.01	<.01	N.01	0.49	0.33	0.02	<.01	<.005	<.005	<.05	<.05	<.0002	--
11/06/79a	0.024	0.03	0.03	<.01	N.03	0.25	0.07	--	--	--	--	--	--	--	19.8
Sampling Locations: a--T06S,R39E,31D; b--T06S,R39E,31C.															

Table A05. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Davis Creek near Busby, Muddy Creek near Busby-Lame Deer, and Lame Deer Creek near Lame Deer (Accessory Stations); Cow Creek near Colstrip (Miscellaneous Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Davis Creek near Busby																			
06/26/78a	17.0	8.12	1530	2.6	7.3	9.7	--	--	714	88.8	120.	117.	491	599	0.0	4.6	440	0.30	1370
07/25/78a	21.2	8.20	1670	1.2	2.3	7.7	7.8	--	752	83.2	132.	131.	511	623	0.0	4.3	454	0.30	1429
09/08/78a	16.4	8.20	2450	1.8	3.5	--	--	--	1072	110.	194.	238.	618	754	0.0	6.2	875	0.37	2177
08/24/79a	17.0	8.12	2065	7.2	28.4	6.9	--	--	779	84.6	138.	201.	586	715	0.0	16.6	604	0.28	1761
Sampling Location: a--T04S,R38E,11D.																			
Muddy Creek near Busby-Lame Deer																			
06/26/78a	12.5	8.30	1530	11.	21.8	11.0	--	--	788	99.2	131.	84.0	440	537	0.0	3.8	538	0.57	1394
07/25/78b	22.5	8.30	1460	18.	34.5	11.3	8.9	--	708	78.8	124.	82.8	416	508	0.0	3.6	458	0.52	1256
09/08/78a	20.3	8.08	1580	1.7	3.4	--	--	--	780	87.2	137.	118.	467	569	0.0	4.9	498	0.74	1415
05/20/79a	16.4	8.30	1410	7.0	16.1	12.6	1.5	--	719	85.1	123.	77.8	400	488	0.0	3.8	475	0.50	1253
08/24/79a	20.0	8.29	1561	0.5	0.6	12.2	--	--	665	71.7	118.	100.	424	517	0.0	5.7	436	0.68	1249
11/02/79a	4.1	8.28	1700	5.6	12.5	12.3	2.5	--	--	--	--	120.	521	636	0.0	3.5	555	0.74	--
Sampling Locations: a--T02S,R40E,35C; b--T03S,R40E,02D.																			
Lame Deer Creek near Lame Deer																			
07/12/78a	15.5	8.13	982	4.5	6.2	--	--	--	459	72.8	67.3	53.5	432	527	0.0	3.0	114	0.86	839
08/16/78a	15.5	8.38	875	12.	26.4	8.1	--	--	460	73.3	67.3	48.4	422	515	0.0	2.8	124	0.81	832
08/27/78a	12.0	8.22	935	4.5	21.3	--	--	--	453	70.4	67.3	49.8	404	493	0.0	4.8	144	0.80	831
11/05/78a	3.9	8.30	1010	3.6	7.2	--	--	--	495	86.0	68.1	56.0	451	550	0.0	3.6	135	0.93	900
08/07/79b	19.4	8.04	1032	2.6	5.6	5.0	--	--	484	71.8	73.9	56.1	437	533	0.0	3.7	145	0.90	885
11/06/79b	3.5	8.40	1020	1.7	1.8	13.1	3.0	80	--	--	--	55.0	460	561	0.0	4.2	158	0.85	--
Sampling Locations: a--T03S,R41E,10A; b--T03S,R41E,03B.																			
Cow Creek near Colstrip																			
05/20/79a	25.3	8.05	5760	4.0	5.2	--	--	--	2884	360.	482.	545.	469	572	0.0	19.2	3525	0.50	5504
Sampling Location: a--T01N,R43E,06D																			

Table A06. Water Quality Analyses Completed by DHES: Nutrients and Metals--Davis Creek near Busby, Muddy Creek near Busby-Lame Deer, and Lame Deer Creek near Lame Deer (Accessory Stations); Cow Creek near Colstrip (Miscellaneous Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Davis Creek near Busby															
06/26/78a	0.034	0.084	0.09	0.02	0.11	--	0.23	0.09	0.01	<.005	<.001	<.005	<.005	<.0002	--
07/25/78a	0.045	0.078	0.03	0.02	0.05	--	0.22	0.12	<.01	<.005	<.001	<.005	<.005	<.0002	--
09/08/78a	0.028	0.06	0.12	0.02	0.14	--	0.47	0.24	0.01	<.005	<.001	<.005	<.005	0.0026	--
08/24/79a	0.121	0.06	<.01	0.03	N.03	--	0.50	0.39	<.01	<.005	<.001	0.005	<.005	<.0002	--
Sampling Location: a--T04S,R38E,11D.															
Muddy Creek near Busby-Lame Deer															
06/26/78a	0.020	0.074	0.53	0.04	0.57	--	0.31	0.08	0.01	<.005	<.001	<.005	0.008	0.0073	--
07/25/78b	0.018	0.066	0.42	0.02	0.44	--	0.33	0.070	0.01	0.010	<.001	<.005	<.005	<.0002	--
09/08/78a	0.015	0.03	0.06	0.04	0.10	--	0.18	0.058	<.01	<.005	<.001	<.005	<.01	<.0002	--
05/20/79a	0.004	0.02	0.01	0.01	0.02	--	0.21	0.065	<.01	<.005	0.003	<.005	<.005	<.0002	--
08/24/79a	0.007	<.01	0.02	<.01	N.02	--	0.13	0.04	<.01	<.005	<.001	0.005	<.005	<.0002	--
11/02/79a	0.005	0.02	0.13	0.02	0.15	0.41	0.10	--	--	--	--	--	--	--	16.5
Sampling Locations: a--T02S,R40E,35C; b--T03S,R40E,02D.															
Lame Deer Creek near Lame Deer															
07/12/78a	0.047	0.073	0.12	0.02	0.14	--	0.23	0.045	<.01	<.005	<.001	0.008	<.005	<.0002	--
08/16/78a	0.028	0.064	0.32	0.02	0.34	--	0.46	0.068	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/27/78a	0.058	0.079	0.34	0.04	0.38	--	--	--	--	--	--	--	--	--	--
11/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/07/79b	0.056	0.07	<.01	0.04	N.04	--	0.25	0.10	<.01	<.005	<.001	0.005	<.005	<.0002	--
11/06/79b	0.012	0.02	0.15	<.01	N.15	0.29	0.09	--	--	--	--	--	--	--	23.8
Sampling Locations: a--T03S,R41E,10A; B--T03S,R41E,03B.															
Cow Creek near Colstrip															
05/20/79a	--	--	--	--	--	--	0.18	--	--	--	--	--	--	--	--
Sampling Location: a--T01N,R43E,06D.															

Table A07: Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Tongue River near Sheridan-Decker, Ash Creek near Sheridan-Decker, and Youngs Creek near Sheridan-Decker (Accessory Stations).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Tongue River near Sheridan-Decker																			
07/07/78a	12.0	7.97	239	15.	--	8.7	--	--	--	--	--	--	--	--	--	--	--	--	--
08/26/78a	21.9	8.59	540	5.1	13.3	10.9	4.8	--	273	57.6	31.4	19.0	199	226	8.2	3.1	102.	0.25	448
06/26/79b	21.0	8.26	292	13.	33.8	10.0	--	--	145	33.2	15.1	9.5	124	151	0.0	1.6	43.2	0.11	254
07/26/79a	21.8	8.30	592	12.	22.9	9.4	--	--	--	--	--	--	--	--	--	--	--	--	--
08/06/79a	27.2	8.15	640	7.6	17.5	8.4	--	--	294	62.0	33.9	24.9	211	257	0.0	3.9	111.	0.20	493
08/30/79b	23.5	8.34	625	3.5	14.3	11.3	--	--	283	57.5	33.9	23.3	213	260	0.0	3.0	114.	0.24	492
09/05/79a	23.0	8.38	550	5.5	11.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/18/79b	12.5	8.60	579	5.5	18.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/18/79c	14.1	8.58	582	3.0	3.4	13.0	--	--	--	--	--	--	--	--	--	--	--	--	--
Ash Creek near Sheridan-Decker																			
06/10/78a	15.0	8.42	1275	6.7	9.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/26/79a	14.3	8.10	1600	1.0	1.7	9.4	--	--	726	126.	100.	102.	341	416	0.0	51.0	485.	0.60	1281
08/06/79a	15.8	8.01	1653	3.0	6.6	8.2	--	--	731	123.	103.	108.	334	408	0.0	50.3	512.	0.30	1304
08/30/79a	18.0	8.17	1632	0.9	4.2	12.0	--	--	711	120.	100.	100.	322	393	0.0	51.6	500.	0.57	1265
10/18/79a	11.9	7.82	1590	0.8	0.7	8.8	2.2	570	--	--	--	--	--	--	--	--	--	--	--
Youngs Creek near Sheridan-Decker																			
08/26/78a	17.8	8.38	782	24.	41.0	--	--	--	379	65.6	52.3	37.0	310	370	4.1	3.0	141.	0.70	674
07/13/79a	21.2	8.38	890	94.	193.	8.9	--	--	418	69.7	59.3	43.2	328	395	2.4	3.7	181.	0.93	756
07/26/79a	21.0	8.34	1215	64.	112.	8.7	--	--	565	81.7	87.8	72.6	356	425	4.8	5.5	314.	0.70	992
08/06/79a	22.7	8.30	1352	33.	58.9	--	--	--	586	79.8	94.0	85.7	351	415	6.7	6.0	381.	0.70	1069
08/30/79a	19.2	8.30	1002	25.	48.3	10.2	--	--	429	61.9	66.6	53.6	331	404	0.0	2.9	216.	0.72	806
10/18/79a	10.9	8.30	1000	20.	28.4	9.6	1.9	210	--	--	--	--	--	--	--	--	--	--	--

Sampling Locations (Wyoming): a--T57N,R84W,01CA; b--T57N,R84W,01CB; c--T57N,R84W,01B (Interstate Ditch).

Sampling Location (Wyoming): a--T57N,R84W,01B.

Sampling Location (Wyoming): a--T58N,R83W,30B.

Table A08. Water Quality Analyses Completed by DHES: Nutrients and Metals--Tongue River near Sheridan-Decker, Ash Creek near Sheridan-Decker, and Youngs Creek near Sheridan-Decker (Accessory Stations).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Tongue River near Sheridan-Decker															
07/07/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/26/78a	0.033	0.057	0.01	0.01	0.02	--	--	--	--	--	--	--	--	--	--
06/26/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/26/79a	0.060	0.10	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
08/06/79a	0.050	0.08	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
08/30/79b	0.047	0.04	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
09/05/79a	--	--	--	--	--	--	0.26	--	--	--	--	--	--	<.0002	--
10/18/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/18/79c	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ash Creek near Sheridan-Decker															
06/10/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/26/79a	0.016	0.02	0.08	0.03	0.11	--	0.07	0.030	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/06/79a	0.009	0.01	0.07	0.01	0.08	--	--	--	--	--	--	--	--	--	--
08/30/79a	0.010	0.01	0.03	0.04	0.07	--	0.08	0.03	<.01	<.005	<.001	<.005	<.005	<.0002	28.
10/18/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Youngs Creek near Sheridan-Decker															
08/26/78a	0.016	0.040	0.11	0.02	0.13	--	0.75	0.086	<.01	<.005	<.001	<.005	<.005	<.0002	--
07/13/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/26/79a	0.079	0.13	0.11	0.01	0.12	--	1.4	0.15	<.01	0.007	<.001	<.005	<.005	<.0002	--
08/06/79a	0.048	0.07	0.03	0.02	0.05	--	--	--	--	--	--	--	--	--	--
08/30/79a	0.050	0.07	<.01	0.03	N.03	--	0.80	0.10	<.01	0.005	<.001	0.005	<.005	<.0002	22.
10/18/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sampling Locations (Wyoming): a--T57N,R84W,01CA; b-T57N,R84W,01CB;c--T57N,R84W,01B (Interstate Ditch).

Sampling Location (Wyoming): a--T57N,R84W,01B.

Sampling Location (Wyoming): a--T58N,R83W,30B.

Table A09. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Tongue River near Pyramid Butte-Birney (Intensive Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
06/28/78a	19.5	8.03	270	42.	42.5	8.6	--	--	124	27.4	13.5	9.1	91	111	0.0	1.3	33.8	0.14	196
07/19/78a	18.2	8.02	333	24.	--	8.0	1.4	--	--	--	--	--	--	--	--	--	--	--	--
08/03/78a	23.5	8.50	362	7.0	9.8	12.8	--	--	181	38.6	20.6	14.3	125	143	4.8	2.2	93.2	0.17	317
08/18/78a	19.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/78a	20.0	8.30	597	2.6	3.3	9.0	1.1	--	279	57.2	33.0	27.0	180	220	0.0	2.8	148.	0.27	488
08/27/78a	18.1	8.20	610	2.2	3.5	--	--	--	288	58.4	34.5	26.9	182	222	0.0	3.1	149.	0.26	494
09/05/78a	20.0	8.00	665	1.4	2.9	7.9	--	--	304	62.4	36.0	31.1	189	230	0.0	3.4	163.	0.27	526
09/09/78a	19.8	8.11	648	2.0	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/08/78a	13.4	8.48	705	3.3	4.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/04/78a	8.3	8.45	798	1.7	0.9	11.7	1.9	20	359	65.2	47.7	46.2	232	273	4.8	4.2	211.	0.37	652
03/31/79a	5.0	8.20	1030	2.0	4.2	13.8	--	--	468	83.2	63.2	64.0	250	305	0.0	5.2	320.	0.34	841
05/19/79a	16.1	8.30	942	8.0	12.8	12.8	3.1	--	424	70.7	60.1	56.0	211	257	0.0	4.8	308.	0.31	757
06/21/79a	17.9	8.18	438	7.7	9.0	9.5	--	--	--	--	--	--	--	--	--	--	--	--	--
08/01/79a	25.5	8.16	510	32.	105.	9.2	--	--	--	--	--	--	--	--	--	--	--	--	--
08/08/79a	23.8	8.34	576	31.	135.	10.2	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/79a	20.2	8.16	631	7.8	35.0	7.6	--	--	--	--	--	--	--	--	--	--	--	--	--
09/05/79a	21.5	8.42	645	7.5	4.3	9.0	--	--	--	--	--	--	--	--	--	--	--	--	--
09/15/79a	16.4	8.10	672	4.0	8.6	8.4	--	--	--	--	--	--	--	--	--	--	--	--	--
09/29/79a	17.3	8.50	718	2.3	2.4	10.9	2.2	--	--	--	--	--	--	--	--	--	--	--	--
10/19/79a	11.4	8.32	788	2.1	2.8	8.8	1.1	180	--	--	--	--	--	--	--	--	--	--	--
11/02/79a	6.5	8.22	782	3.3	1.9	12.5	2.2	--	--	--	--	--	--	--	--	--	--	--	--
11/05/79a	6.3	7.80	768	1.4	6.7	12.6	1.9	20	--	--	--	--	--	--	--	--	--	--	--

Sampling Location: a--T06S,R42E,31D.

Table A10. Water Quality Analyses Completed by DHES: Nutrients and Metals--Tongue River near Pyramid Butte-Birney (Intensive Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
06/28/78a	0.031	0.112	0.16	0.05	0.21	--	0.76	0.08	<.01	0.005	<.001	<.005	0.006	<.0002	--
07/19/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/03/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/78a	0.005	0.023	0.02	0.01	0.03	--	--	--	--	--	--	--	--	--	--
08/24/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/27/78a	0.006	0.014	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
09/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/09/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/08/78a	0.002	0.02	<.01	<.01	<.02	--	0.06	0.040	<.01	<.005	<.001	<.005	<.005	<.0002	--
11/04/78a	<.001	0.01	0.02	0.01	0.03	--	0.05	0.019	<.01	<.005	<.001	<.005	<.01	<.0002	--
03/31/79a	0.002	0.02	0.25	<.01	N.25	--	--	--	--	--	--	--	--	--	--
05/19/79a	0.003	0.03	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
06/21/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/01/79a	0.069	0.12	0.03	<.01	N.03	--	--	--	--	--	--	--	--	--	--
08/08/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/79a	0.020	0.05	<.01	<.01	<.02	--	0.34	0.065	--	--	--	--	--	<.0002	--
09/05/79a	--	--	--	--	--	--	0.16	--	--	--	--	--	--	<.0002	--
09/15/79a	0.010	0.03	0.01	<.01	N.01	--	--	--	--	--	--	--	--	--	--
09/29/79a	<.001	<.01	0.01	0.01	0.02	0.52	0.08	--	--	--	--	--	--	<.0002	--
10/19/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/02/79a	0.004	0.01	0.01	0.01	0.02	0.25	0.06	--	--	--	--	--	--	<.0002	4.2
11/05/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.2

Sampling Location: a--T06S,R42E,31D.

Table A11. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Squirrel Creek near Decker (Intensive Station) and Deer Creek near Decker (Accessory Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Squirrel Creek near Decker																			
06/10/78b	15.0	8.30	1365	10.	--	10.3	--	--	--	--	--	--	--	--	--	--	--	--	--
08/26/78b	19.8	8.40	2140	3.5	8.1	12.6	--	--	986	98.0	180.	188.	412	488	7.2	4.9	918	0.46	1885
11/04/78b	4.5	8.22	1980	6.1	9.8	--	--	--	967	121.	162.	138.	481	586	0.0	4.8	770	0.50	1782
04/01/79b	1.7	8.18	1375	29.	105.	11.5	--	--	681	104.	102.	82.0	344	420	0.0	3.4	462	0.35	1174
05/20/79b	12.3	8.10	1540	16.	37.4	9.5	1.4	--	764	107.	121.	93.8	388	473	0.0	2.9	565	0.40	1364
06/21/79b	21.2	8.32	2100	11.	23.2	11.5	--	--	--	--	--	--	--	--	--	--	--	--	--
07/26/79a	20.5	8.22	2260	60.	139.	8.4	--	--	--	--	--	--	--	--	--	--	--	--	--
08/08/79a	19.5	8.33	2347	19.	39.6	8.8	--	--	--	--	--	--	--	--	--	--	--	--	--
08/17/79a	21.8	8.29	2210	11.	28.0	12.7	--	--	--	--	--	--	--	--	--	--	--	--	--
09/05/79a	19.5	8.32	2930	16.	40.1	11.7	--	--	--	--	--	--	--	--	--	--	--	--	--
09/15/79a	14.5	8.22	2500	12.	32.9	13.3	3.6	--	--	--	--	--	--	--	--	--	--	--	--
09/28/79a	15.5	8.32	3400	17.	33.9	15.0	4.9	--	--	--	--	--	--	--	--	--	--	--	--
10/18/79a	11.6	8.35	2550	14.	30.8	14.0	3.5	720	--	--	--	--	--	--	--	--	--	--	--
11/01/79a	2.8	8.27	2150	14.	21.6	13.7	2.8	--	--	--	--	--	--	--	--	--	--	--	--
11/06/79a	2.4	8.31	2210	18.	44.8	12.8	2.8	90	--	--	--	--	--	--	--	--	--	--	--
Deer Creek near Decker																			
06/10/78a	22.0	8.12	5550	5.9	--	11.0	--	--	--	--	--	--	--	--	--	--	--	--	--
08/15/78a	21.5	8.15	5450	3.6	7.1	13.4	--	--	2109	257.	357.	835.	356	435	0.0	27.2	3330	0.31	5240
08/26/78a	24.0	8.49	6000	2.0	6.9	--	--	--	2084	220.	373.	878.	237	272	8.4	33.4	3770	0.23	5555
10/18/79a	10.7	8.08	6100	2.3	1.7	9.5	1.5	80	--	--	--	--	--	--	--	--	--	--	--
11/05/79a	1.7	8.02	6100	4.8	1.4	11.0	2.1	140	--	--	--	865.	536	654	0.0	28.0	4000	0.34	--

Sampling Locations: a--T09S,R40E,29CD; b--T09S,R40E,29CB.

Sampling Location: a--T09S,R41E,10C.

Table A12. Water Quality Analyses Completed by DHES: Nutrients and Metals--Squirrel Creek near Decker (Intensive Station) and Deer Creek near Decker (Accessory Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Squirrel Creek near Decker															
06/10/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/26/78b	0.007	0.020	0.05	0.02	0.07	--	0.16	0.055	<.01	0.005	<.001	<.005	<.005	<.0002	--
11/04/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
04/01/79b	0.012	0.07	0.32	0.04	0.36	--	--	--	--	--	--	--	--	--	--
05/20/79b	0.028	0.05	<.01	<.01	<.02	--	0.60	0.17	<.01	<.005	<.001	<.005	<.005	<.0002	--
06/21/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/26/79a	0.080	0.15	0.13	0.03	0.16	--	--	--	--	--	--	--	--	--	--
08/08/79a	0.035	0.06	0.17	0.02	0.19	--	--	--	--	--	--	--	--	--	--
08/17/79a	0.019	0.04	0.03	0.03	0.06	--	--	--	--	--	--	--	--	--	--
09/05/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/15/79a	0.019	0.03	0.09	0.01	0.10	--	--	--	--	--	--	--	--	--	--
09/28/79a	0.012	0.03	0.09	0.02	0.11	0.65	--	--	--	--	--	--	--	--	--
10/18/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/01/79a	0.022	0.03	0.07	0.03	0.10	0.56	--	--	--	--	--	--	--	--	13.7
11/06/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12.6

Sampling Locations: a--T09S,R40E,29CD; b--T09S,R40E,29CB.

Deer Creek near Decker															
06/10/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/15/78a	0.016	0.039	0.64	0.02	0.66	--	0.33	0.077	0.02	<.005	<.001	<.005	<.005	<.0002	--
08/26/78a	0.006	0.030	<.01	0.03	N.03	--	--	--	--	--	--	--	--	--	--
10/18/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/05/79a	0.005	0.01	<.01	<.01	<.02	--	0.20	--	--	--	--	--	--	--	9.0

Sampling Location: a--T09S,R41E,10C.

Table A13. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Canyon Creek near Decker-Birney, Prairie Dog Creek near Pyramid Butte-Birney, and Bull Creek near Phyramid Butte-Birney (Accessory Stations); Crazy Head Springs near Ashland-Lame Deer (Miscellaneous Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Canyon Creek near Decker-Birney																			
11/04/78a	9.0	8.80	1590	1.3	1.0	--	--	--	640	57.6	121.	160.	431	447	38.4	6.0	488.	0.74	1319
06/21/79a	18.2	8.50	1560	1.3	<.4	10.4	--	--	730	60.8	141.	145.	424	483	16.8	5.1	541.	0.80	1393
06/26/79a	18.2	8.64	1595	1.1	1.2	11.7	--	--	640	55.3	122.	148.	434	473	27.8	8.0	510.	0.76	1345
07/27/79a	22.8	8.63	1620	1.0	0.8	13.2	--	--	--	41.8	126.	152.	383	429	19.2	8.2	498.	0.70	1271
08/30/79a	17.0	8.43	1654	0.4	0.8	12.2	--	--	647	51.2	--	150.	427	521	0.0	8.2	537.	0.73	1395
11/02/79a	4.3	8.38	1640	0.5	0.8	13.1	1.9	--	--	--	--	148.	438	534	0.0	5.8	575.	0.78	--
Sampling Location: a--T07S,R31E,11C.																			
Prairie Dog Creek near Pyramid Butte-Birney																			
07/12/79b	20.9	8.55	1580	0.8	0.9	10.5	--	--	762	47.8	156.	108.	358	393	21.6	7.5	617.	0.39	1351
08/18/79a	15.7	7.77	1752	1.3	2.2	8.5	--	--	707	93.5	115.	150.	412	503	0.0	8.2	543.	0.96	1414
08/30/79b	15.2	8.29	1879	0.5	0.8	10.6	--	--	856	57.5	173.	103.	377	460	0.0	9.0	674.	0.44	1477
09/05/79a	15.7	7.55	1690	1.1	0.8	4.8	--	--	--	--	--	--	--	--	--	--	--	--	--
11/02/79a	6.4	7.70	1720	1.2	2.0	11.0	3.5	--	--	--	--	170.	444	542	0.0	5.6	635.	0.86	--
Sampling Locations: a--T06S,R42E,31D (at mouth); b--T06S,R41E,26A.																			
Bull Creek near Pyramid Butte-Birney																			
07/12/79a	19.2	8.40	1640	8.4	13.1	8.2	--	--	629	49.3	123.	181.	440	501	17.5	6.6	518.	0.64	1397
08/08/79a	21.3	8.54	1839	0.6	2.0	9.3	--	--	654	54.2	126.	199.	456	521	17.3	7.8	571.	0.80	1498
08/30/79a	15.2	8.35	1884	11.	22.0	8.1	--	--	656	60.0	123.	199.	462	564	0.0	8.0	584.	0.76	1539
Sampling Location: a--T06S,R42E,19A.																			
Crazy Head Springs near Ashland-Lame Deer																			
08/09/79a	18.8	7.91	480	--	--	--	--	--	225	42.8	28.8	15.8	230	281	0.0	1.8	17.2	1.30	388
Sampling Location: a--T02S,R42E,35C.																			

Table A14. Water Quality Analyses Completed by DHES: Nutrients and Metals--Canyon Creek near Decker-Birney, Prairie Dog Creek near Pyramid Butte-Birney and Bull Creek near Pyramid Butte-Birney (Accessory Stations); Crazy Head Springs near Ashland-Lame Deer (Miscellaneous Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Canyon Creek near Decker-Birney															
11/04/78a	<.001	<.01	0.43	0.01	0.44	--	--	--	--	--	--	--	--	--	--
06/21/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/26/79a	0.001	0.01	0.35	<.01	N.35	--	0.05	0.005	<.01	<.005	<.001	0.005	<.005	<.0002	--
07/27/79a	0.002	<.01	0.30	<.01	N.30	--	0.02	0.010	<.01	<.005	<.001	0.005	0.005	<.0002	--
08/30/79a	<.001	<.01	0.58	--	N.58	--	0.02	<.005	<.01	<.005	<.001	0.006	<.005	<.0002	20.
11/02/79a	<.001	<.01	0.80	0.01	0.81	0.15	0.07	--	--	--	--	--	--	--	20.2
Sampling Location: a--T07S,R41E,11C.															
Prairie Dog Creek near Pyramid Butte-Birney															
07/12/79b	0.008	0.03	<.01	<.01	<.02	--	0.06	0.010	0.01	<.005	<.001	<.005	<.005	<.0002	--
08/18/79a	0.006	0.01	0.38	0.01	0.39	--	0.12	0.035	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/30/79b	<.001	0.01	0.05	0.03	0.08	--	0.03	0.005	<.01	<.005	<.001	0.005	0.007	<.0002	11.7
09/05/79a	0.010	0.01	0.40	0.02	0.42	--	--	--	--	--	--	--	--	--	--
11/02/79a	<.001	<.01	0.10	0.01	0.11	0.26	0.08	--	--	--	--	--	--	--	23.0
Sampling Locations: a--T06S,R42E,31D (at mouth); b--T06S,R41E,26A.															
Bull Creek near Pyramid Butte-Birney															
07/12/79a	0.009	0.04	0.25	0.03	0.28	--	0.21	0.010	0.01	<.005	<.001	<.005	<.005	<.0002	--
08/08/79a	<.001	<.01	0.36	<.01	N.36	--	0.10	0.015	<.01	<.005	<.001	0.006	<.005	<.0002	--
08/30/79a	0.020	0.02	0.41	0.06	0.47	--	0.36	0.04	<.01	<.005	<.001	0.005	<.005	<.0002	11.7
Sampling Location: a--T06S,R42E,19A.															
Crazy Head Springs near Ashland-Lame Deer															
08/09/79a	0.016	0.03	0.06	0.03	0.09	--	0.10	0.045	<.01	<.005	<.001	<.005	<.005	<.0002	--
Sampling Location: a--T02S,R42E,35C.															

Table A15. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Cook Creek near Birney-Birney Village, Logging Creek near Ashland, and Beaver Creek near Brandenberg (Accessory Stations).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Cook Creek near Birney-Birney Village																			
06/11/78b	20.0	8.49	1880	4.1	--	8.8	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/78c	13.5	8.35	1730	2.2	1.9	8.5	1.1	--	712	92.0	117.	193.	557	671	4.1	4.0	579	1.20	1662
09/08/78a	19.0	8.40	1800	3.3	4.6	--	--	--	783	91.2	111.	192.	550	652	9.1	3.6	498	1.20	1558
09/05/79a	16.4	8.20	1860	4.9	7.6	6.8	--	--	695	82.3	119.	197.	584	713	0.0	6.8	507	1.50	1626
Sampling Locations: a--T05S,R42E,25B; b--T05S,R42E,23C; c--T05S,R42E,26B.																			
Logging Creek near Ashland																			
06/27/78a	20.0	8.51	984	33.	45.9	8.0	--	--	425	55.6	69.5	81.0	439	486	24.0	1.2	134	0.98	852
08/16/78a	16.5	8.40	838	17.	16.7	9.1	--	--	406	57.6	63.7	55.0	394	481	0.0	7.0	116	0.90	781
09/08/78b	20.2	8.22	898	15.	18.8	--	--	--	404	60.8	61.3	57.8	390	476	0.0	3.2	147	1.00	807
07/28/79b	22.2	7.85	958	13.	4.5	7.8	--	--	400	69.7	55.0	66.1	277	338	0.0	4.0	248	0.60	782
09/06/79c	19.0	8.31	1125	19.	39.8	8.2	--	--	471	56.6	80.0	87.0	462	564	0.0	3.6	193	1.20	985
Sampling Locations: a--T03S,R44E,20C; b--T03S,R44E,28A; c--T03S,R44E,19A.																			
Beaver Creek near Brandenberg																			
07/13/78c	22.0	8.19	2740	13.	--	11.3	--	--	--	--	--	--	--	--	--	--	--	--	--
09/03/78b	21.8	8.32	2670	6.2	13.1	10.9	9.8	--	833	96.8	144.	352.	518	630	0.5	3.1	1047	0.56	2274
10/09/78b	7.2	8.30	2910	12.	12.8	--	--	--	999	131.	163.	405.	655	798	0.0	4.5	1190	0.63	2692
11/05/78d	5.0	7.60	5000	3.0	10.9	3.9	3.5	<10	1828	214.	314.	685.	664	809	0.0	9.0	2415	0.54	4447
07/12/79a	25.9	8.22	2805	1.7	2.2	11.9	--	--	973	111.	169.	367.	500	588	11.0	10.1	1210	0.47	2466
07/18/79a	28.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/79a	18.0	8.06	2925	2.1	2.2	4.5	--	--	--	113.	172.	350.	448	547	0.0	9.5	1260	0.46	2452
Sampling Locations: a--T01S,R46E,20B; b--T01S,R45E,10D; c--T01S,R45E,10A; d-T01N,R44E,35A (near mouth).																			

Table A16. Water Quality Analyses Completed by DHES: Nutrients and Metals--Cook Creek near Birney-Birney Village, Logging Creek near Ashland, and Beaver Creek near Brandenberg (Accessory Stations).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Cook Creek near Birney-Birney Village															
06/11/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/78c	0.064	0.068	0.39	0.01	0.40	--	0.22	0.064	<.01	<.005	<.001	<.005	<.005	<.0002	--
09/08/78a	0.014	0.05	0.01	0.02	0.03	--	0.19	0.054	0.01	<.005	<.001	<.005	<.005	<.0002	--
09/05/79a	0.018	0.02	<.01	0.03	N.03	--	0.75	0.37	<.01	<.005	<.001	<.005	<.005	<.0002	--
Logging Creek near Ashland															
06/27/78a	0.017	0.088	0.07	0.02	0.09	--	0.63	0.04	0.02	0.008	<.001	<.005	0.005	<.0002	--
08/16/78a	0.012	0.04	0.02	<.01	N.02	--	0.36	0.015	0.01	<.005	<.001	<.005	<.005	0.0003	--
09/08/78b	0.012	0.04	0.01	0.03	0.04	--	0.47	0.085	<.01	<.005	<.001	<.005	<.005	<.0002	--
07/28/79b	0.024	0.06	0.20	0.02	0.22	--	--	--	--	--	--	--	--	--	--
09/06/79c	0.012	0.04	<.01	0.01	N.01	--	0.45	0.02	<.01	<.005	<.001	<.05	<.05	<.0002	--
Beaver Creek near Brandenberg															
07/13/78c	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/03/78b	0.011	0.05	<.01	0.02	N.02	--	0.22	0.10	<.01	<.005	<.001	<.005	<.01	<.0002	--
10/09/78b	0.010	0.04	<.01	0.02	N.02	--	0.39	0.12	<.01	0.005	<.001	<.005	<.01	<.0002	--
11/05/78d	0.014	0.04	0.02	0.02	0.04	--	1.1	0.41	0.01	<.005	<.001	<.005	<.01	<.0002	--
07/12/79a	0.014	0.06	<.01	<.01	<.02	--	0.12	0.070	0.01	<.005	<.001	<.005	<.005	<.0002	--
07/18/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/79a	0.008	0.01	<.01	0.17	N.17	--	0.25	0.41	<.01	0.005	<.001	0.008	0.008	<.0002	--

Sampling Locations: a--T05S,R42E,25B; b--T05S,R42E,23C; c--T05S,R42E,26B.

Sampling Locations: a--T03S,R44E,20C; b--T03S,R44E,28A; c--T03S,R44E,19A.

Sampling Locations: a--T01S,R46E,20B; b--T01S,R45E,10D; c--T01S,R45E,10A; d--T01N,R44E,35A (near mouth).

Table A17. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Upper Hanging Woman Creek near Quietus-Decker (Intensive Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO3	CO3	Cl	SO4	F	DS
06/16/78a	14.0	7.88	3590	60.	--	7.0	--	--	--	--	--	--	--	--	--	--	--	--	--
06/28/78a	23.0	8.10	6100	13.	28.1	8.1	--	--	2041	254	342	995	515	628	0.0	12.7	5450	0.57	7682
07/18/78a	24.0	8.12	5910	17.	--	8.1	3.2	--	--	--	--	--	--	--	--	--	--	--	--
08/15/78a	17.0	8.12	3920	14.	23.7	7.5	--	--	1372	164	234	620	464	566	0.0	13.2	1983	0.76	3581
08/26/78a	22.5	8.30	4350	11.	16.3	--	--	--	1428	174	242	662	442	539	0.0	12.6	2390	0.74	4020
08/28/78a	21.5	8.18	4400	7.1	14.1	9.7	2.7	--	1412	173	238	620	445	542	0.0	13.2	2365	0.81	3952
09/05/78a	23.5	8.20	4220	18.	30.8	10.0	--	--	--	--	--	--	--	--	--	--	--	--	--
09/09/78a	20.0	8.08	4200	7.0	11.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/07/78a	12.7	8.10	4050	5.4	--	--	--	--	1316	168	218	580	449	547	0.0	14.1	2100	0.77	3628
11/04/78a	6.2	8.10	4200	4.8	5.3	11.6	2.5	--	1400	192	224	622	472	576	0.0	15.0	2200	1.00	3830
05/19/79a	18.3	8.00	6100	14.	24.2	9.3	4.2	--	2020	238	346	960	530	647	0.0	15.2	3350	0.62	5556
06/21/79b	21.0	8.10	5200	9.0	14.0	9.2	--	--	--	--	--	--	--	--	--	--	--	--	--
07/27/79b	26.6	8.21	4750	3.6	6.5	10.3	--	--	--	--	--	--	--	--	--	--	--	--	--
08/08/79b	22.3	8.27	4893	3.0	6.7	8.0	--	--	--	--	--	--	--	--	--	--	--	--	--
08/17/79b	24.3	8.25	4738	5.8	15.2	11.4	--	--	--	--	--	--	--	--	--	--	--	--	--
09/04/79b	23.5	8.18	3400	2.4	3.7	10.9	--	--	--	--	--	--	--	--	--	--	--	--	--
09/14/79b*	18.9	8.31	3320	3.3	4.0	11.7	--	--	767	120	179	463	368	449	0.0	17.4	1650	0.70	2771
09/28/79c*	20.9	8.25	@	3.5	6.0	15.3	--	--	3474	328	645	1950	466	569	0.0	30.3	6900	0.40	@
09/28/79b	17.3	8.18	3800	2.9	2.4	10.4	3.4	--	--	--	--	--	--	--	--	--	--	--	--
10/18/79b	10.8	8.02	3900	3.5	3.6	9.3	2.3	30	--	--	--	--	--	--	--	--	--	--	--
11/01/79b	4.9	8.02	3700	4.7	5.2	10.9	2.2	--	--	--	--	--	--	--	--	--	--	--	--
11/05/79b	4.9	8.00	3780	4.6	4.5	11.1	1.5	--	--	--	--	560	475	580	0.0	13.2	2250	0.74	--

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D; c--T10S,R43E,02A (near Montana-Wyoming border).
*Synoptic run collections.
@Specific conductance equals 11,000 umhos per centimeter at 25C; dissolved solids equal 10,423 mg/l.

Table A18. Water Quality Analyses Completed by DHES: Nutrients and Metals--Upper Hanging Woman Creek near Quietus-Decker (Intensive Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
06/16/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/28/78a	0.012	0.079	0.01	0.02	0.03	--	0.44	0.36	0.02	<.005	<.001	<.005	<.005	<.0002	--
07/18/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/15/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/26/78a	0.013	0.076	<.01	0.02	N.02	--	--	--	--	--	--	--	--	--	--
08/28/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/09/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/07/78a	<.001	0.01	0.01	<.01	N.01	--	--	--	--	--	--	--	--	--	--
11/04/78a	0.002	0.02	0.06	0.01	0.07	--	0.21	0.064	0.01	<.005	<.001	<.005	<.01	<.0002	--
05/19/79a	0.009	0.06	<.01	<.01	<.02	--	0.51	0.20	<.01	<.005	<.001	<.005	0.010	<.0002	--
06/21/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/27/79b	0.007	0.03	0.01	0.01	0.02	--	--	--	--	--	--	--	--	--	--
08/08/79b	0.008	0.04	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
08/17/79b	0.005	0.03	<.01	0.02	N.02	--	--	--	--	--	--	--	--	--	--
09/04/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/14/79b*	0.011	0.02	<.01	0.03	N.03	--	--	--	--	--	--	--	--	--	--
09/28/79c*	0.522	0.62	0.02	0.10	0.12	1.5	--	--	--	--	--	--	--	--	--
09/28/79b	<.001	<.01	<.01	0.01	N.01	0.50	--	--	--	--	--	--	--	--	--
10/18/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/01/79b	<.001	0.01	0.04	0.02	0.06	0.24	--	--	--	--	--	--	--	--	7.8
11/05/79b	--	--	--	--	--	--	0.25	--	--	--	--	--	--	--	8.1

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D; c--T10S,R43E,02A (near Montana-Wyoming border).
*Synoptic run collections.

Table A19. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Lower Hanging Woman Creek near Birney (Intensive Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
06/16/78b	19.0	8.18	4100	20.	--	6.2	--	--	--	--	--	--	--	--	--	--	--	--	--
06/29/78b	22.0	8.10	3810	52.	131.	5.4	--	--	1252	165	204	487	496	605	0.0	12.1	1300	0.84	2774
07/19/78b	20.2	8.11	3700	23.	--	6.2	2.2	--	--	--	--	--	--	--	--	--	--	--	--
08/15/78b	22.0	8.14	3120	17.	30.1	9.2	--	--	1084	133	183	490	280	342	0.0	12.2	1575	0.94	2735
08/18/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/27/78b	18.0	8.22	3350	13.	19.3	9.4	3.3	--	1084	140	178	480	514	627	0.0	13.4	1525	1.00	2965
08/28/78b	22.2	8.12	3230	16.	30.6	10.5	--	--	1020	134	167	460	489	596	0.0	12.4	1465	0.11	2834
09/05/78b	23.5	8.12	3330	5.0	7.7	9.0	--	--	--	--	--	--	--	--	--	--	--	--	--
09/09/78b	20.3	8.08	3380	4.0	6.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/07/78b	11.8	8.10	3340	3.3	4.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/04/78b	6.3	8.10	2960	4.4	3.9	10.4	2.2	20	964	133	153	418	546	666	0.0	12.1	1200	1.10	2584
02/11/79a	-0.3	8.00	2820	6.5	9.2	12.0	1.5	--	932	134	145	342	512	625	0.0	12.0	1075	1.00	2334
03/31/79c	7.5	8.02	3520	8.8	11.0	11.3	--	--	1124	151	182	502	408	498	0.0	12.0	1690	0.56	3035
05/19/79a	17.9	8.10	3540	16.	28.8	8.8	3.3	--	1181	152	194	505	501	611	0.0	12.6	1760	0.86	3236
06/22/79a	19.8	8.02	3390	24.	38.0	6.6	--	--	--	--	--	--	--	--	--	--	--	--	--
07/28/79a	21.7	8.10	2970	26.	38.4	6.6	--	--	--	--	--	--	--	--	--	--	--	--	--
08/07/79a	24.5	8.07	2580	32.	55.1	8.8	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/79a	20.8	8.18	3159	36.	65.0	7.2	--	--	--	--	--	--	--	--	--	--	--	--	--
09/04/79a	22.2	8.10	2970	17.	23.8	8.6	2.4	--	--	--	--	--	--	--	--	--	--	--	--
09/14/79d*	18.2	8.08	3590	5.9	14.1	10.9	--	--	1072	139	176	484	406	495	0.0	18.9	1650	0.83	2964
09/14/79a*	16.3	8.12	2890	15.	24.6	9.1	--	--	897	117	147	384	433	528	0.0	15.7	1200	1.00	2393
09/15/79e*	12.4	8.09	3200	4.5	9.4	9.6	--	--	963	122	160	433	433	528	0.0	16.8	1430	1.10	2691
09/29/79a	16.4	8.18	2720	24.	28.9	8.4	--	--	--	--	--	--	--	--	--	--	--	--	--
10/19/79a	11.1	8.10	2600	27.	32.6	7.9	1.8	50	--	--	--	--	--	--	--	--	--	--	--
11/02/79a	5.4	8.05	2660	5.5	6.2	11.0	2.0	--	--	--	--	-	--	--	--	--	--	--	--
11/05/79a	4.7	8.18	2720	5.0	6.8	11.1	1.6	100	--	--	--	--	--	--	--	--	--	--	--

Sampling Locations: a--T06S,R43E,19D; b--T06S,R43E,18D; c--T07S,R43E,05A and d--T07S,R43E,17C (intermediate sites); e--T06S,R43E,18B (near mouth).

*Synoptic run collections.

Table A20. Water Quality Analyses Completed by DHES: Nutrients and Metals--Lower Hanging Woman Creek near Birney (Intensive Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
06/16/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/29/78b	0.013	0.163	0.12	0.03	0.15	--	2.1	0.27	0.02	0.008	<.001	<.005	0.005	<.0002	--
07/19/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/15/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/78b	0.008	0.033	0.01	0.02	0.03	--	--	--	--	--	--	--	--	--	--
08/27/78b	0.010	0.030	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
08/28/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/05/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/09/78b	0.003	0.02	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
10/07/78b	<.001	<.01	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
11/04/78b	0.003	0.02	0.01	0.01	0.02	--	--	--	--	--	--	--	--	--	--
02/11/79a	<.01	0.02	0.26	0.08	0.34	0.45	--	--	--	--	--	--	--	--	--
03/31/79c	0.003	0.02	0.07	0.01	0.08	--	--	--	--	--	--	--	--	--	--
05/19/79a	0.011	0.05	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
06/22/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/28/79a	0.021	0.06	0.02	0.02	0.04	--	--	--	--	--	--	--	--	--	--
08/07/79a	0.032	0.08	<.01	0.02	0.02	--	--	--	--	--	--	--	--	--	--
08/18/79a	0.034	0.06	<.01	0.08	N.08	--	--	--	--	--	--	--	--	--	--
09/04/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/14/79d*	0.010	0.02	<.01	0.02	N.02	--	--	--	--	--	--	--	--	--	--
09/14/79a*	0.005	0.03	<.01	0.03	N.03	--	--	--	--	--	--	--	--	--	--
09/15/79e*	0.007	0.02	<.01	0.02	N.02	--	--	--	--	--	--	--	--	--	--
09/29/79a	0.011	0.03	<.01	0.02	N.02	0.50	--	--	--	--	--	--	--	--	--
10/19/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/02/79a	0.005	0.01	<.01	<.01	<.02	0.21	--	--	--	--	--	--	--	--	19.2
11/05/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	18.2

Sampling Locations: a--T06S,R43E,19D; b--T06S,R43E,18D; c--T07S,R43E,05A, and d--T07S,R43E,17C (intermediate sites); e--T06S,R43E,18B (near mouth).

*Synoptic run collections.

Table A21. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Stroud Creek near Quietus-Decker and Lee Creek near Quietus-Birney (Miscellaneous Stations); East Fork of Hanging Woman Creek near Birney (Intensive Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Stroud Creek near Quietus-Decker																			
07/13/79a	20.9	8.19	2850	0.7	1.0	--	--	--	806	96.8	137.	448.	573	669	14.4	14.6	1130	1.70	2512
09/04/79a	23.8	8.31	2830	0.7	1.2	8.2	--	--	821	103.	137.	430.	586	715	0.0	18.8	1120	1.70	2525
11/05/79a	3.5	7.90	2680	14.	46.4	13.0	1.6	110	--	--	--	398.	500	610	0.0	12.2	1062	1.50	--
Lee Creek near Quietus-Birney																			
07/12/79b	18.9	7.62	3490	3.4	16.5	--	--	--	1054	109.	190.	569.	669.	816	0.0	30.3	1490	0.99	3205
East Fork of Hanging Woman Creek near Birney																			
06/11/78a	10.5	8.10	1375	3.4	--	10.2	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/78a	12.0	8.30	1290	1.7	2.3	9.0	0.5	--	520	77.8	79.0	140.	468	571	0.0	14.0	350	1.12	1233
08/27/78a	12.8	8.20	1355	2.2	1.9	--	--	--	535	89.6	75.6	127.	446	544	0.0	4.5	335	1.20	1177
09/09/78a	16.4	8.22	1390	4.4	16.3	--	--	--	544	94.0	75.1	157.	455	555	0.0	4.6	390	1.25	1277
10/08/78a	11.7	8.20	1360	0.9	0.9	--	--	--	536	99.2	70.0	131.	463	564	0.0	4.9	313	1.20	1183
11/04/78c	8.1	8.12	1340	0.8	0.4	10.8	1.4	5200	507	95.6	65.2	131.	458	559	0.0	5.4	301	1.20	1158
02/11/79c	3.5	8.19	1295	13.	27.0	12.0	1.8	--	496	80.8	71.5	118.	438	534	0.0	5.0	309	1.15	1120
03/31/79a	9.6	8.29	1325	1.8	4.8	11.4	--	--	496	82.8	70.3	124.	394	478	1.2	4.9	285	1.00	1047
05/19/79a	15.8	8.20	1300	7.0	12.6	9.9	2.3	--	507	86.4	70.8	126.	449	548	0.0	4.0	304	1.10	1140
06/22/79b	14.2	7.85	1300	3.5	19.6	9.2	--	--	501	78.6	74.0	128.	434	529	0.0	5.9	346	1.17	1163
07/28/79b	13.7	8.24	1355	11.	10.1	9.7	--	--	498	82.5	71.0	129.	449	548	0.0	6.7	308	1.20	1146
08/07/79b	15.7	8.17	1357	4.1	12.6	7.9	--	--	505	81.7	73.0	129.	477	582	0.0	6.4	267	1.20	1140
08/20/79b	13.0	8.10	1364	1.1	1.4	8.8	--	--	482	89.0	63.0	120.	435	531	0.0	6.3	278	1.20	1088
09/05/79b	12.0	8.02	1315	1.6	1.5	10.3	2.6	--	--	--	--	--	--	--	--	--	--	--	--
09/06/79a	10.3	8.12	1320	1.9	2.1	9.4	1.2	--	--	--	--	--	--	--	--	--	--	--	--
09/29/79b	14.0	8.20	1295	0.8	0.4	9.5	--	--	498	79.6	72.6	133.	438	534	0.0	6.0	304	1.30	1131
10/19/79b	10.1	8.01	1300	0.6	0.4	9.0	1.1	30	--	--	--	--	--	--	--	--	--	--	--
10/19/79a	10.3	8.00	1300	0.7	0.4	9.3	1.2	30	--	--	--	--	--	--	--	--	--	--	--
11/05/79b	8.5	7.50	1165	2.2	46.6	11.0	0.8	30	--	--	--	120.	362	442	0.0	5.4	358	0.91	--

Sampling Locations: a--T08S,R43E,02A(Stroud Creek); b--T07S,R44E,20D (Lee Creek).

Sampling Locations: a--T06S,R43E,20DB; b--T06S,R43E,20DA; c--T06S,R43E,20CA.

Table A22. Water Quality Analyses Completed by DHES: Nutrients and Metals--Stroud Creek near Quietus-Decker and Lee Creek near Quietus-Birney (Miscellaneous Stations); East Fork of Hanging Woman Creek near Birney (Intensive Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Stroud Creek near Quietus-Decker															
07/13/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/04/79a	0.016	0.02	<.01	0.06	N.06	--	0.16	0.02	<.01	<.005	<.001	0.007	<.005	<.0002	--
11/05/79a	<.001	<.01	<.01	<.01	<.02	--	0.15	--	--	--	--	--	--	--	14.0
Lee Creek near Quietus-Birney															
07/12/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sampling Locations: a--T08S,R43E,02A (Stroud Creek); b--T07S,R44E,20D (Lee Creek).

East Fork of Hanging Woman Creek near Birney															
06/11/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/78a	0.027	0.032	0.07	0.07	0.14	--	0.13	0.020	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/27/78a	0.027	0.027	0.05	0.04	0.09	--	--	--	--	--	--	--	--	--	--
09/09/78a	0.001	0.02	0.04	0.02	0.06	--	0.14	0.019	<.01	<.005	<.001	<.005	<.005	<.0002	--
10/08/78a	0.004	<.01	<.01	<.01	<.02	--	0.04	0.010	<.01	<.005	<.001	<.005	<.005	<.0002	--
11/04/78c	0.009	0.01	0.01	<.01	N.01	--	<.01	0.005	<.01	<.005	<.001	<.005	<.01	<.0002	--
02/11/79c	0.010	0.03	0.03	0.03	0.06	0.22	0.37	0.039	<.01	0.015	<.001	<.005	<.005	<.0002	--
03/31/79a	0.005	<.01	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
05/19/79a	0.013	0.03	0.01	0.01	0.02	--	0.24	0.025	<.01	0.005	<.001	<.005	<.005	<.0002	--
06/22/79b	0.020	0.03	0.08	0.01	0.09	--	0.16	0.025	0.01	0.005	<.001	<.005	<.005	<.0002	--
07/28/78b	0.043	0.05	0.06	0.07	0.13	--	0.26	0.025	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/07/79b	0.020	0.02	0.01	<.01	N.01	--	--	--	--	--	--	--	--	--	--
08/20/79b	0.007	0.02	<.01	<.01	<.02	--	0.15	0.020	--	<.005	--	--	--	--	--
09/05/79b	0.010	<.01	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
09/06/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/29/79b	0.002	<.01	<.01	<.01	<.02	0.17	0.02	<.005	<.01	<.005	<.005	<.05	<.05	<.0002	--
10/19/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/19/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/05/79b	0.006	0.01	0.01	<.01	N.01	0.08	0.07	--	--	--	--	--	--	--	30.0

Sampling Locations: a--T06S,R43E,20DB; b--T06S,R43E,20DA; c--T06S,R43E,20CA.

Table A23. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Bear Creek near Otter, Upper Otter Creek near Otter-Fort Howe, and Cow Creek near Otter-Fort Howe (Accessory Stations).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO3	CO3	Cl	SO4	F	DS
Bear Creek near Otter																			
07/12/79a	20.0	7.90	3850	0.9	1.0	13.6	--	--	1350	183.	217.	526.	459	560	0.0	21.2	1890	0.55	3398
08/07/79a	20.1	8.09	4066	1.9	2.7	15.8	--	--	1468	197.	237.	512.	462	564	0.0	21.6	1950	0.50	3482
08/23/79a	19.8	8.09	4032	1.9	2.6	12.1	--	--	--	183.	221.	538.	442	539	0.0	21.1	1940	0.55	3444
09/30/79a*	10.7	7.84	3700	2.8	2.8	5.2	--	--	1350	183.	217.	500.	463	565	0.0	21.4	1940	0.63	3427

Sampling Location: a--T07S,R45E,27A.
*Synoptic run collection.

Upper Otter Creek near Otter-Fort Howe																			
07/07/78c	13.0	8.18	2840	2.2	11.7	11.1	--	--	1084	130.	184.	280.	476	581	0.0	8.0	1065	0.60	2249
08/29/78b	17.8	8.20	3160	4.4	10.1	10.9	1.6	--	1180	143.	200.	378.	408	498	0.0	12.5	1440	0.56	2672
06/27/79b	19.0	8.00	3314	6.0	9.1	10.4	--	--	1244	162.	204.	380.	414	505	0.0	15.2	1550	0.52	2817
07/18/79a	25.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/31/79a	22.8	7.63	2014	53.	61.0	7.1	--	--	709	114.	103.	221.	278	339	0.0	10.8	835	0.30	1624
08/07/79a	24.3	8.14	3467	1.5	1.3	19.8	--	--	1235	165.	200.	394.	411	501	0.0	17.1	1610	0.40	2888
08/31/79a	21.0	8.06	3533	4.8	12.2	--	--	--	1216	167.	194.	418.	398	486	0.0	17.3	1680	0.48	2963
09/30/79d*	15.8	8.22	6400	1.9	1.3	12.1	--	--	2601	224.	496.	949.	475	580	0.0	29.1	3930	0.59	6208
09/30/79a*	15.5	8.04	3380	15.	32.0	10.3	--	--	1279	179.	202.	444.	450	549	0.0	18.5	1690	0.54	3084

Sampling Locations: a--T07S,R45E,13D;b--T07S,R46E,06B; c--T06S,R46E,30B;d--T08S,R46E,05C (above Bear Creek).
*Synoptic run collections.

Cow Creek near Otter-Fort Howe																			
06/27/79a	11.5	8.20	462	4.4	15.5	8.8	--	--	237	49.7	27.3	18.3	213	250	4.8	2.7	43.9	1.20	398
07/31/79a	19.0	8.21	506	2.2	5.8	9.5	--	--	239	52.1	26.4	19.5	232	283	0.0	2.2	40.6	1.20	425
08/31/79a	19.6	8.34	523	1.5	7.2	--	--	--	235	51.9	25.7	20.0	235	272	0.0	2.5	37.9	1.20	411

Sampling Location: a--T06S,R45E,17D.

Table A24. Water Quality Analyses Completed by DHES: Nutrients and Metals--Bear Creek near Otter, Upper Otter Creek near Otter-Fort Howe, and Cow Creek near Otter-Fort Howe (Accessory Stations).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Bear Creek near Otter															
07/12/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/07/79a	0.004	0.01	0.76	<.01	N.76	--	0.10	0.050	0.01	<.005	<.001	0.011	<.005	<.0002	--
08/23/79a	0.009	0.01	0.93	<.01	N.93	--	0.13	0.04	0.01	<.005	<.001	0.008	<.005	<.0002	--
09/30/79a*	<.001	<.01	0.43	0.02	0.45	0.43	--	--	--	--	--	--	--	--	--
Upper Otter Creek near Otter-Fort Howe															
07/07/78c	0.017	0.033	0.02	0.02	0.04	--	0.25	0.08	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/29/78b	0.005	0.02	0.22	0.04	0.26	--	0.34	1.4	<.01	<.005	<.001	<.005	<.01	<.0002	--
06/27/79b	0.009	0.02	0.26	0.08	0.34	--	0.36	0.18	0.01	<.005	<.001	<.005	<.005	<.0002	--
07/18/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/31/79a	0.046	0.12	0.38	0.05	0.43	--	1.1	0.23	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/07/79a	0.006	0.03	0.36	0.01	0.37	--	--	--	--	--	--	--	--	--	--
08/31/79a	0.016	0.016	0.30	<.01	N.30	--	0.37	0.19	<.01	<.005	<.001	0.009	<.005	<.0002	20.
09/30/79d*	<.001	0.01	<.01	<.01	<.02	0.65	0.18	<.005	0.01	<.005	<.005	<.05	<.05	<.0002	--
09/20/79a*	0.019	0.04	0.71	0.09	0.80	1.2	--	--	--	--	--	--	--	--	--
Cow Creek near Otter-Fort Howe															
06/27/79a	0.027	0.04	0.03	0.11	0.14	--	0.29	0.075	<.01	<.005	<.001	<.005	<.005	<.0002	--
07/31/79a	0.029	0.03	0.03	<.01	N.03	--	0.17	0.035	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/31/79a	0.030	0.02	<.01	0.03	N.03	--	0.17	0.06	<.01	<.005	<.001	<.005	<.005	<.0002	30.

Sampling Location: a--T07S,R45E,27A.
*Synoptic run collection.

Sampling Locations: a--T07S,R45E,13D;b--T07S,R46E,06B; c--T06S,R46E,30B;d--T08S,R46E,05C (above Bear Creek).
*Synoptic run collections.

Sampling Location: a--T06S,R45E,17D.

Table A25. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Lower Otter Creek near Ashland (Intensive Station).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
06/15/78a	22.5	8.35	3290	17.	--	7.0	--	--	--	--	--	--	--	--	--	--	--	--	--
07/05/78a	24.0	8.33	3050	18.	--	6.9	--	--	--	--	--	--	--	--	--	--	--	--	--
07/21/78a	19.2	8.29	2810	25.	--	6.8	3.2	--	--	--	--	--	--	--	--	--	--	--	--
07/31/78a	25.5	8.32	2900	16.	26.8	7.9	--	--	1051	88.0	202.	404.	524	566	36.0	9.9	1270	0.71	2576
08/19/78a	17.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/27/78a	18.6	8.33	2900	23.	37.2	--	--	--	981	85.6	186.	390.	521	630	2.4	10.4	1232	0.72	2538
09/04/78a	21.2	8.40	2920	15.	22.4	6.8	--	--	--	--	--	--	--	--	--	--	--	--	--
10/08/78a	10.7	8.30	2790	7.3	11.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/05/78a	5.1	8.30	2950	5.5	6.6	12.3	2.5	1600	--	--	--	--	--	--	--	--	--	--	--
02/11/79a	-0.3	7.90	3040	7.2	7.6	11.5	1.0	--	1046	118.	183.	418.	598	730	0.0	10.0	1375	0.80	2835
03/31/79b	3.2	8.12	2840	27.	48.4	11.3	--	--	1006	116.	174.	335.	442	539	0.0	10.1	1178	0.48	2344
05/20/79a	18.2	8.29	3310	18.	35.0	9.1	2.4	--	1123	106.	208.	440.	542	661	0.0	10.4	1450	0.68	2876
06/20/79a	19.2	8.40	3080	23.	39.0	8.9	--	--	--	--	--	--	--	--	--	--	--	--	--
07/28/79a	24.8	8.15	2400	28.	42.5	7.2	--	--	--	--	--	--	--	--	--	--	--	--	--
08/07/79a	25.9	8.46	3271	26.	46.6	8.5	--	--	--	--	--	--	--	--	--	--	--	--	--
08/18/79a	22.8	8.53	2985	23.	42.0	9.4	--	--	--	--	--	--	--	--	--	--	--	--	--
09/04/79a	21.9	8.45	2250	16.	23.2	8.1	2.4	--	--	--	--	--	--	--	--	--	--	--	--
09/29/79a*	16.5	8.49	2670	15.	21.1	8.1	2.2	--	--	--	--	--	--	--	--	--	--	--	--
09/30/79c*	14.3	8.08	3010	3.6	5.8	7.5	--	--	1094	98.4	206.	396.	421	514	0.0	16.6	1440	0.59	2671
09/30/79a*	15.7	8.43	2700	15.	22.3	7.3	--	--	838	65.2	164.	398.	445	543	0.0	15.4	1170	0.80	2356
10/26/79a	9.5	8.35	2890	15.	22.8	9.6	2.8	--	--	--	--	--	--	--	--	--	--	--	--
11/02/79a	4.6	8.35	2830	6.2	7.6	12.6	2.1	--	--	--	--	--	--	--	--	--	--	--	--
11/06/79a	3.8	8.42	2900	4.4	7.5	12.9	2.9	2500	--	--	--	--	--	--	--	--	--	--	--

Sampling Locations: a--T03S,R44E,12C; b--T04S,R45E,04B; c--T05S,R45E,11C (intermediate site).
*Synoptic run collections.

Table A26. Water Quality Analyses Completed by DHES: Nutrients and Metals--Lower Otter Creek near Ashland (Intensive Station).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
06/15/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/21/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/31/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/19/78a	0.006	0.06	0.05	0.03	0.08	--	--	--	--	--	--	--	--	--	--
08/27/78a	0.013	--	0.07	0.04	0.11	--	--	--	--	--	--	--	--	--	--
09/04/78a	0.060	0.4	0.10	0.02	0.12	--	0.45	0.73	0.01	<.005	<.001	<.005	<.01	<.0002	--
10/08/78a	0.004	0.02	0.07	0.02	0.09	--	--	--	--	--	--	--	--	--	--
11/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
02/11/79a	<.01	0.02	0.66	0.22	0.88	0.62	--	--	--	--	--	--	--	--	--
03/31/79b	0.017	0.08	0.31	0.21	0.52	--	--	--	--	--	--	--	--	--	--
05/20/79a	0.018	0.06	<.01	<.01	<.02	--	--	--	--	--	--	--	--	--	--
06/20/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/28/79a	0.043	0.11	0.11	0.07	0.18	--	--	--	--	--	--	--	--	--	--
08/07/79a	0.031	0.08	0.02	0.02	0.04	--	--	--	--	--	--	--	--	--	--
08/18/79a	0.025	0.06	0.05	0.29	0.34	--	--	--	--	--	--	--	--	--	--
09/04/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/29/79a*	0.010	0.03	0.04	0.02	0.06	0.65	--	--	--	--	--	--	--	--	--
09/30/79c*	0.001	0.03	<.01	0.01	N.01	0.78	--	--	--	--	--	--	--	--	--
09/30/79a*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/26/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/02/79a	0.008	0.01	0.10	0.04	0.14	0.46	--	--	--	--	--	--	--	--	5.2
11/06/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.9

Sampling Locations: a--T03S,R44E,12C;b--T04S,R45E,04B; c--T05S,R45E,11C (intermediate site).
*Synoptic run collections.

Table A27. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Pumpkin Creek near Miles City and Mizpah Creek near Mizpah (Intensive Stations).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Pumpkin Creek near Miles City																			
06/15/78b	23.0	7.60	478	225.	--	6.0	--	--	--	--	--	--	--	--	--	--	--	--	--
07/05/78a	13.0	7.41	598	3850.	--	1.9	--	--	--	--	--	--	--	--	--	--	--	--	--
07/21/78a	19.2	7.65	920	1500.	--	6.7	6.0	--	--	--	--	--	--	--	--	--	--	--	--
07/31/78a	25.5	8.41	1880	22.	25.8	8.0	--	--	339	65.0	42.9	350.	310	354	12.0	5.8	782	0.44	1612
08/19/78a	24.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/23/78a	27.3	8.63	2100	18.	22.8	--	--	--	312	60.4	39.2	390.	393	445	16.6	6.0	725	0.54	1683
09/06/78a	25.6	8.27	2580	43.	69.8	8.9	--	--	354	61.0	49.0	494.	383	467	0.0	11.0	1030	0.49	2130
10/09/78a	13.8	8.50	1205	46.	27.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
02/10/78a	(No sample collected because riffle frozen.)																		
05/12/79a	13.3	8.02	4650	17.	41.8	10.3	3.1	--	1225	156.	203.	740.	542	661	0.0	10.9	2110	0.42	3882
08/09/79a	27.5	8.55	5998	10.	22.4	19.0	--	--	826	78.6	153.	1230.	475	541	19.0	19.8	2780	0.50	4822
08/21/79a	22.9	8.62	7030	26.	42.8	10.3	--	--	911	69.7	179.	1470.	558	622	28.8	27.8	3400	0.63	5798
11/07/79a	3.3	8.58	8700	13.	18.9	5.7	--	60	--	--	--	1770.	606	739	0.0	24.4	5288	0.42	--

Sampling Locations: a--T06N,R48E,35C; b--T06N,R48E,28D.

Mizpah Creek near Mizpah																			
06/15/78a	25.5	8.52	2410	23.	--	8.0	--	--	--	--	--	--	--	--	--	--	--	--	--
07/05/78a	23.5	7.70	950	6800.	--	6.5	--	--	--	--	--	--	--	--	--	--	--	--	--
07/21/78b	22.0	7.89	900	3200.	--	7.3	5.2	--	--	--	--	--	--	--	--	--	--	--	--
07/31/78b	22.0	7.82	910	11600	22550	6.9	--	--	92	28.8	24.9	205.	303	370	0.0	2.2	380	0.62	1011
08/19/78b	28.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
09/06/78b	30.5	8.60	2460	15.	20.8	10.9	--	--	122	16.0	20.0	562.	636	776	0.0	9.8	708	0.60	2102
10/09/78b	19.5	8.40	1950	23.	12.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
02/10/79b	(No sample collected because riffle frozen.)																		
05/12/79a	15.0	8.30	3280	22.	45.1	9.8	2.7	--	776	123.	114.	540.	406	495	0.0	9.0	1450	0.34	2732
08/09/79a	29.2	8.73	3080	35.	55.5	12.1	--	--	238	40.0	33.5	654.	470	531	20.9	15.3	1120	0.60	2415
08/21/79a	21.4	8.65	3624	29.	45.6	11.2	--	--	242	35.7	37.1	835.	533	597	26.4	20.0	1390	0.58	2941
11/07/79a	1.3	8.50	3700	17.	10.7	12.3	--	10	--	--	--	795.	748	913	0.0	8.1	1615	0.50	--

Sampling Locations: a--T06N,R51E,24C; b--T06N,R51E,25C.

Table A28. Water Quality Analyses Completed by DHES: Nutrients and Metals--Pumpkin Creek near Miles City and Mizpah Creek near Mizpah (Intensive Stations).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Pumpkin Creek near Miles City															
06/15/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/21/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/31/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/19/78a	0.011	0.081	<.01	0.02	N.02	--	--	--	--	--	--	--	--	--	--
08/23/78a	0.014	0.056	0.01	0.02	0.03	--	--	--	--	--	--	--	--	--	--
09/06/78a	0.023	0.11	0.01	0.12	0.13	--	0.69	0.10	0.01	<.005	<.001	<.005	<.005	<.0002	--
10/09/78a	0.041	0.09	<.01	0.02	N.02	--	--	--	--	--	--	--	--	--	--
02/10/79a	(No sample collected because riffle frozen.)														
05/12/79a	0.009	0.03	<.01	0.06	N.06	--	--	--	--	--	--	--	--	--	--
08/09/79a	0.021	0.03	<.01	0.21	N.21	--	--	--	--	--	--	--	--	--	--
08/21/79a	0.024	10.8	<.01	0.05	N.05	--	0.44	0.11	<.01	<.005	<.001	0.005	<.005	<.0002	--
11/07/79a	0.012	0.08	0.04	0.17	0.21	--	0.23	--	--	--	--	--	--	--	2.8

Sampling Locations: a--T06N,R48E,35C; b--T06N,R48,28D.

Mizpah Creek near Mizpah															
06/15/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/05/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/21/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/31/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/19/78b	0.006	0.053	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
09/06/78b	0.005	0.02	0.04	0.03	0.07	--	0.34	0.054	0.03	<.005	<.001	<.005	<.005	<.0002	--
10/09/78b	0.016	0.04	0.05	0.02	0.07	--	0.36	0.10	<.01	<.005	<.001	<.005	<.01	<.0002	--
02/10/79b	(No sample collected because riffle frozen.)														
05/12/79a	0.014	0.04	<.01	0.02	N.02	--	--	--	--	--	--	--	--	--	--
08/09/79a	0.032	0.07	<.01	0.03	N.03	--	--	--	--	--	--	--	--	--	--
08/21/79a	0.021	0.07	<.01	0.08	N.08	--	0.46	0.095	<.01	<.005	<.001	0.005	<.005	<.0002	--
11/07/79a	0.018	0.03	<.01	<.01	<.02	0.58	0.15	--	--	--	--	--	--	--	--

Sampling Locations: a--T06N,R51E,24C; b--T-6N,R51E,25C.

Table A29. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--East Fork of Armells Creek near Colstrip and Main Armells Creek near Colstrip (Miscellaneous Stations); West Fork of Armells Creek near Colstrip and Lower Armells Creek near Forsyth (Accessory Stations).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
East Fork of Armells Creek near Colstrip																			
08/24/78a	23.3	8.10	6400	3.5	4.4	--	--	--	3316	330.	605.	665.	487	594	0.0	54.6	4038	0.27	6287
06/13/79a	26.7	8.12	4200	0.7	1.4	14.3	3.6	--	2302	236.	416.	385.	350	427	0.0	36.0	2590	0.29	4090
10/26/79b	10.8	8.20	4640	1.5	0.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sampling Locations: a--T03N,R41E,28C; b--T03N,R41E,33B.																			
West Fork of Armells Creek near Colstrip																			
05/28/78b	15.8	8.27	5600	3.9	--	7.3	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/78c	22.0	8.20	6000	15.	26.6	--	--	--	1404	190.	226.	1040.	534	651	0.0	23.8	3167	0.43	5298
06/13/79a	29.7	8.15	5600	7.8	14.5	10.9	2.2	--	1680	175.	302.	930.	460	561	0.0	20.9	3150	0.34	5140
07/03/79a	27.0	8.28	4080	5.7	9.4	10.5	--	--	1276	163.	211.	559.	472	547	14.4	2.2	1870	0.36	3367
Sampling Locations: a--T04N,R40E,32B; b--T04N,R40E,29D; c--T04N,R40E,21B.																			
Main Armells Creek near Colstrip																			
06/13/79a	27.3	8.02	5200	15.	24.6	9.4	1.9	--	1610	222.	256.	820.	482	588	0.0	23.8	2850	0.35	4760
10/26/79a	11.5	8.17	6400	6.6	11.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sampling Location: a--T04N,R40E,16B.																			
Lower Armells Creek near Forsyth																			
08/24/78b*	23.7	8.72	571	17.	20.9	--	--	--	190	46.0	18.3	56.5	133	148	7.2	6.5	165	0.37	448
05/13/79b	15.8	8.05	5200	16.	44.4	9.4	1.9	136	1440	184.	238.	820.	514	627	0.0	25.3	2610	0.33	4505
07/03/79a	30.2	8.47	4800	5.6	8.6	9.9	--	--	865	82.6	160.	937.	442	495	21.6	28.0	2360	0.43	4085
08/22/79a	21.4	8.44	4700	2.9	2.0	10.2	--	--	612	72.1	105.	927.	507	584	16.8	32.0	2000	0.54	3738
09/21/79a	24.3	8.70	4300	1.5	1.4	14.8	2.7	--	--	--	--	--	--	--	--	--	--	--	--
11/07/79a	4.8	8.55	4205	12.	12.8	11.5	--	190	--	--	--	855	619	755	0.0	17.2	1915	0.55	--

Sampling Locations: a--T06N,R39E,26B; b--T06N,R39E,23D.
*Lower Armells probably affected by Yellowstone River irrigation return flows on this sampling date.

Table A30. Water Quality Analyses Completed by DHES: Nutrients and Metals--East Fork of Armells Creek near Colstrip and Main Armells Creek near Colstrip (Miscellaneous Stations); West Fork of Armells Creek near Colstrip and Lower Armells Creek near Forsyth (Accessory Stations).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
East Fork of Armells Creek near Colstrip															
08/24/78a	0.010	0.014	<.01	0.07	N.07	--	--	--	--	--	--	--	--	--	--
06/13/79a	0.003	0.03	<.01	0.02	N.02	--	0.10	0.025	0.02	<.005	<.001	0.005	<.005	<.0002	--
10/26/79b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sampling Locations: a--T03N,R41E,28C; b--T03N,R41E,33B.															
West Fork of Armells Creek near Colstrip															
05/28/78b	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/78c	0.008	0.032	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--
06/13/79a	0.003	0.02	0.03	0.01	0.04	--	0.16	0.035	0.02	<.005	0.001	<.007	<.005	<.0002	--
07/03/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sampling Locations: a--T04N,R40E,32B; b--T04N,R40E,29D; c--T04N,R40E,21b.															
Main Armells Creek near Colstrip															
06/13/79a	0.006	0.03	<.01	<.01	<.02	--	0.32	0.12	0.01	<.005	<.001	<.005	<.005	<.0002	--
10/26/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sampling Location: a--T04N,R40E,16B.															
Lower Armells Creek near Forsyth															
08/24/78b*	0.017	0.030	0.04	0.01	0.05	--	--	--	--	--	--	--	--	--	--
05/13/79b	0.013	0.03	0.01	0.06	0.07	--	--	--	--	--	--	--	--	--	--
07/03/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/22/79a	0.005	0.02	<.01	0.03	N.03	--	--	--	--	--	--	--	--	--	--
09/21/79a	<.001	0.01	<.01	0.07	N.07	--	--	--	--	--	--	--	--	--	--
11/07/79a	0.010	0.03	0.11	<.01	N.11	0.48	0.34	0.06	<.01	<.005	<.005	<.05	<.05	<.0002	3.4
Sampling Locations: a--T06N,R39E,26B; b--T06N,R39E,23D.															
*Lower Armells probably affected by Yellowstone River irrigation return flows on this sampling date.															

Table A31. Water Quality Analyses Completed by DHES: Field Parameters and Common Ions--Sweeney Creek near Rosebud, Reservation Creek near Forsyth-Hysham, and Sarpy Creek near Hysham (Accessory Stations).

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
Sweeney Creek near Rosebud																			
05/28/78a	14.8	8.40	2250	34.	--	8.0	--	--	--	--	--	--	--	--	--	--	--	--	--
07/12/78a	24.0	8.48	2840	14.	10.1	--	--	--	411	57.6	72.2	428.	432	527	0.0	28.6	1075	0.66	2189
08/23/78a	24.4	8.60	2930	7.5	9.9	--	--	--	476	55.2	82.1	518.	389	464	5.0	40.5	1187	0.69	2353
05/13/79a	15.2	8.20	2800	8.5	21.7	10.0	1.7	27	521	75.2	80.9	480.	498	608	0.0	19.2	1110	0.48	2374
08/21/79a	24.4	8.38	2948	11.	17.5	10.9	--	--	439	54.3	73.8	538.	387	472	0.0	43.1	1110	0.68	2293
09/21/79a	19.9	8.42	2880	8.9	14.0	10.1	2.0	--	--	--	--	--	---	--	--	--	--	--	--
11/07/79a	3.7	8.30	2770	7.5	13.0	12.6	--	<10	--	--	--	480.	498	608	0.0	31.1	1285	0.61	--
Sampling Location: a--T06N,R43E,22A.																			
Reservation Creek near Forsyth-Hysham																			
05/28/78a	20.0	8.33	2080	6.6	--	10.4	--	--	--	--	--	--	--	--	--	--	--	--	--
07/12/78a	20.0	8.17	2150	2.4	24.0	--	--	--	632	116.	83.2	242.	452	551	0.0	9.8	725	0.46	1728
08/22/78a	18.5	8.20	2240	2.4	4.3	7.0	3.0	--	719	134.	93.4	300.	500	610	0.0	10.5	788	0.44	1936
08/24/78b	17.0	8.22	3710	2.4	3.5	--	--	--	1035	179.	143.	590.	627	764	0.0	24.0	1560	0.58	3261
05/13/79b	15.6	8.02	2000	2.3	1.1	10.4	1.8	20	635	125.	78.4	252.	389	475	0.0	10.4	742	0.40	1683
08/22/79a	18.6	8.22	2014	0.8	0.2	9.2	--	--	550	100.	72.9	277.	345	411	4.8	15.9	744	0.33	1626
09/21/79a	18.3	8.30	2080	1.4	0.8	12.0	3.0	--	--	--	--	--	--	--	--	--	--	--	--
Sampling Locations: a--T06N,R38E,26B; b--T06N,R38E,23A.																			
Sarpy Creek near Hysham																			
05/27/78a	--	7.98	1770	430.	--	7.8	--	--	--	--	--	--	--	--	--	--	--	--	--
07/12/78c	21.5	8.30	3090	11.	--	9.1	--	--	--	--	--	--	--	--	--	--	--	--	--
08/22/78a	19.0	8.30	2840	6.7	8.5	10.1	8.3	--	666	94.4	105.	480.	448	547	0.0	14.0	1180	0.54	2420
08/24/78b*	18.5	8.20	904	27.	51.3	--	--	--	280	60.0	31.6	101.	192	234	0.0	7.6	262	0.39	697
05/13/79b	13.3	8.12	3090	24.	64.2	10.2	2.6	109	1021	124.	173.	410.	481	587	0.0	14.0	1365	0.34	2673
08/22/79a	19.1	8.12	2460	3.9	4.8	12.0	--	--	584	100.	81.2	356.	403	492	0.0	18.6	899	0.46	1947
11/07/79b	4.3	8.25	2220	5.9	9.4	12.9	--	130	--	--	--	322.	470	573	0.0	12.2	750	0.44	--

Sampling Locations: a--T06N,R37E,20A; b--T06N,R37E,07C; c--T06N,R37E,30D.
*Lower Sarpy Creek probably affected by Yellowstone River irrigation return flows on this sampling date.

Table A32. Water Quality Analyses Completed by DHES: Nutrients and Metals--Sweeney Creek near Rosebud, Reservation Creek near Forsyth-Hysham, and Sarpy Creek near Hysham (Accessory Stations).

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
Sweeney Creek near Rosebud															
05/28/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/12/78a	0.017	0.042	0.16	0.01	0.17	--	0.35	0.065	<.01	<.005	<.001	<.005	0.007	<.0002	--
08/23/78a	0.005	0.020	0.07	0.01	0.08	--	--	--	--	--	--	--	--	--	--
05/13/79a	0.006	0.02	0.23	0.02	0.25	--	0.32	0.070	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/21/79a	0.006	0.02	0.47	0.04	0.51	--	0.28	0.10	<.01	<.005	<.001	<.005	<.005	<.0002	--
09/21/79a	0.009	0.02	7.00	0.08	7.08	--	--	--	--	--	--	--	--	--	--
11/07/79a	0.005	0.01	0.62	0.02	0.64	0.35	0.08	--	--	--	--	--	--	--	17.1

Sampling Location: a--T06N,R43E,22A.

Reservation Creek near Forsyth-Hysham															
05/28/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/12/78a	0.027	0.043	<.01	0.01	N.01	--	0.15	0.030	<.01	<.005	<.001	<.005	0.007	<.0002	--
08/22/78a	0.018	0.033	0.02	0.01	0.03	--	0.21	0.26	<.01	<.005	<.001	<.005	<.005	<.0002	--
08/24/78b	0.223	0.254	0.03	0.02	0.05	--	--	--	--	--	--	--	--	--	--
05/13/79b	0.003	0.02	<.01	0.01	N.01	--	0.21	0.090	<.01	0.005	<.001	<.005	<.005	<.0002	--
08/22/79a	0.019	0.03	<.01	0.01	N.01	--	0.04	0.025	<.01	<.005	<.001	<.005	<.005	<.0002	--
09/21/79a	0.020	0.04	<.01	0.03	N.03	--	--	--	--	--	--	--	--	--	--

Sampling Locations: a--T06N,R38E,26B; b-T06N,R38E,23A.

Sarpy Creek near Hysham															
05/27/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
07/12/78c	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/22/78a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
08/24/78b*	0.038	0.070	0.20	0.04	0.24	--	--	--	--	--	--	--	--	--	--
05/13/79b	0.021	0.05	0.01	0.02	0.03	--	0.79	0.18	<.01	<.008	<.001	<.005	<.005	<.0005	--
08/22/79a	0.004	0.011	<.01	0.11	N.11	--	--	--	--	--	--	--	--	--	--
11/07/79b	0.003	0.02	0.19	0.02	0.21	0.50	0.24	0.05	<.01	<.005	<.005	<.05	<.05	<.0002	12.8

Sampling Locations: a--T06N,R37E,30A; b--T06N,R37E,07C; c--T06N,R37E,30D.
*Lower Sarpy Creek probably affected by Yellowstone River irrigation return flows on this sampling date.

Table A33. Water Quality Analyses Completed by DHES: Field Parameters, Common Ions, Nutrients, and Metals--Powder River near Moorhead and Powder River near Mizpah (Miscellaneous Stations).

Powder River near Moorhead--Field Parameters and Common Ions

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
09/14/79a	11.1	8.13	2200	112.	164.	10.7	--	--	631	138.	69.5	271.	194	237	0.0	174.	780	1.50	1671

Powder River near Moorhead--Nutrients and Metals

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
09/14/79a	0.089	0.15	<.01	0.01	N.01	--	--	--	--	--	--	--	--	--	--

Sampling Location: a--T09S,R48E,08C.

Powder River near Mizpah--Field Parameters and Common Ions

Date	Temp	pH	SC	Turb	TSS	DO	BOD	TC	TH	Ca	Mg	Na	TA	HCO_3	CO_3	Cl	SO_4	F	DS
08/09/79a	24.3	7.75	2243	270.	555.	9.8	--	--	748	194.	63.9	234.	167	204	0.0	75.9	972	0.40	1744

Powder River near Mizpah--Nutrients and Metals

Date	OP	TP	NO_x-N	NH_3-N	TIN	TKjN	Fe	Mn	Cu	Zn	Cd	Cr	Pb	Hg	Si
08/09/79a	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sampling Location: a--T06N,R52E,30D.

Table B34. Taxa list, associated systematics, and major habits and characteristics of benthic macroinvertebrates collected from streams draining the southern Fort Union region of southeastern Montana (the first page of eight pages).

Phylum: Arthropoda--joint-footed animals
Subphylum: Mandibulata (Antennata)--antennae present
Class: Insecta (Hexapoda)--insects
Order: Coleptera (COL)--beetles and weevils
Family: Carabidae (L)*--predaceous ground beetles
Family: Chrysomelidae--leaf beetles
Donacia (L)--clinging beetles
Family: Curculionidae (L)*--weevils
Hyperodes (L)--climbing and clinging weevils
Listronotus (L,A)--climbing and clinging weevils
Family: Dryopidae--riffle beetles
Helichus sp. (A)--clinging beetles
Helichus striatus (A)
Family: Dytiscidae (L)*--predaceous diving beetles
Agabus (L,A)--swimming and diving beetles
Deronectes sp. (A)--swimming and climbing beetles
Deronectes liodessus (A)
Deronectes-Oredytes complex (A)
Oreodytes (L)--swimming and climbing beetles
Hydroporus-Hygrotus complex (L)--diving beetles
Rhantus (L)--swimming and diving beetles
Family: Elmidae (L)*--riffle beetles
Dubiraphia sp. (L,A)--clinging and climbing beetles
Dubiraphia vittata (A)
Microcylloepus sp. (L,A)--clinging, climbing beetles
Microcylloepus pusillus (A)
Optioservus sp. (L,A)--clinging beetles
Optioservus divergens (A)
Optioservus quadrimaculatus (A)
Stenelmis sp. (L,A)--clinging beetles
Stenelmis sinuata (A)
Stenelmis sinuata-humerosa complex (A)
Stenelmis vittipennis (A)
Zaitzevia parvula (A)--clinging beetles
Family: Haliplidae--crawling water beetles
Haliplus (L,A)--climbing and swimming beetles
Family: Heteroceridae (L)*--subaquatic and littoral beetles
Family: Hydrophilidae (L)*--water scavenger beetles
Berosus (L)--swimming and diving beetles
Enochrus (L)--burrowing and sprawling beetles
Helophorus (A)--climbing beetles
Hydrochus (L)--climbing beetles
Laccobius (L,A)--swimming and climbing beetles

*An asterisk denotes the collection of a higher taxa representative that could not be identified to the generic level.

L,A: These designations denote the larval and adult forms respectively.

Table B34. Continued (the second page of eight pages).

Class: Insecta--(continued)
- Order: Coleoptera (COL)-(continued)
  - Family: Hydraeinidae (Limnebiidae) (L)*--crawling water beetles
    - Ochthebius (L,A)--clinging beetles
  - Family: Gyrinidae--whirligig beetles
    - Gyrinis-Gyretes complex (L)--surface swimming beetles
  - Family: Limnichidae (L)*--riffle beetles
  - Family: Noteridae#--burrowing water beetles
- Order: Diptera (DIP)--true flies
- Suborder: Brachycera*
  - Family: Dolichopodidae*--burrowing aquatic flies
  - Family: Empididae*--dance flies
    - Clinocera--clinging flies
    - Clinocera-Chelifera complex
    - Hemerodromia--sprawling and burrowing flies
  - Family: Stratiomyidae*--soldier flies
    - Euparyphus--sprawling flies
    - Nemotelus--swimming and sprawling flies
    - Odontomyia (Eulalia)--sprawling flies
    - Stratiomys (Stratiomyia)--sprawling, burrowing flies
  - Family: Tabanidae*--horse and deer flies
    - Chrysops--sprawling and burrowing flies
    - Tabanus--sprawling and burrowing flies
- Suborder: Cyclorrhapha
  - Family: Ephydridae--shore and brine flies
    - Hydrellia--burrowing and mining flies
  - Family: Muscidae (Anthomyiidae)*--aquatic "houseflies"
    - Limnophora--burrowing flies
  - Family: Scatophagidae*--dung flies
- Suborder: Nematocera
  - Family: Blephariceridae#--net-winged midges
  - Family: Ceratopogonidae (Heleidae)*--biting midges, "no-see-ums"
    - Bezzia-burrowing midges
    - Bezzia-Probezzia-Palpomyia complex
    - Palpomyia--burrowing midges
    - Culicoides--burrowing midges
  - Family: Chironomidae*--true midges
  - Family: Culicidae#--mosquitoes
  - Family: Deuterophlebiidae#--mountain midges
  - Family: Dixidae--dixid or dixa midges
    - Dixa--swimming and climbing midges

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L,A: These designations denote the larval and adult forms respectively.

#This designation denotes a generally lotic and/or relatively common higher taxa for which no representatives were collected from the study area streams.

Table B34. Continued (the third page of eight pages).

Class: Insecta--(continued)
- Order: Diptera (DIP)--(continued)
  - Suborder: Nematocera--(continued)
    - Family: Psychodidae*--moth flies
      - Pericoma--burrowing flies
    - Family: Ptychopteridae#--phantom crane flies
    - Family: Simuliidae--black flies
      - Simulium (L,P)--clinging flies
    - Family: Tipulidae*--Craneflies
      - Dicranota--sprawling and burrowing flies
      - Ormosia--semiaquatic, burrowing flies
      - Pseudolimnophilia--burrowing flies
      - Tipula--burrowing flies
- Order: Ephemeroptera (EPH)*--mayflies
  - Family: Baetidae*
    - Baetis--rapid water, free-ranging mayflies
    - Pseudocloeon--swimming and clinging mayflies
  - Family: Baetiscidae#--sprawling and clinging mayflies
  - Family: Caenidae
    - Caenis--quiet water, bottom sprawling mayflies
  - Family: Ephemerellidae*
    - Ephemerella--variable mayflies
  - Family: Ephemeridae
    - Ephemera--quiet water, burrowing mayflies
  - Family: Heptageniidae*
    - Heptagenia--running water, clinging mayflies
    - Rhithrogena--running water, clinging mayflies
    - Stenonema--running water, clinging mayflies
  - Family: Leptophlebiidae*
    - Choroterpes--clinging and bottom sprawling mayflies
    - Choroterpes-Leptophlebia complex
    - Leptophlebia--clinging and swimming mayflies
    - Paraleptophlebia--rapid water, free-ranging mayflies
  - Family: Polymitarcyidae
    - Ephoron--quiet water, burrowing mayflies
  - Family: Siphlonuridae
    - Ameletus--rapid water, free-ranging mayflies
    - Siphlonurus--quiet water, climbing mayflies
  - Family: Tricorythidae
    - Tricorythodes--clinging and bottom sprawling mayflies

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L,P: These designations denote the larval and pupal forms respectively.

#This designation denotes a generally lotic and/or relatively common higher taxa for which no representatives were collected from the study area streams.

Table B34. Continued (the fourth page of eight pages).

Class: Insecta--(continued)
- Order: Hemiptera (HEM)--true bugs
  - Suborder: Heteroptera (L,A)*--aquatic bugs
    - Family: Corixidae*--water boatmen
      - Hesperocorixa sp. --swimming and climbing bugs
      - Hesperocorixa laevigata
      - Hesperocorixa vulgaris
      - Sigara sp.--swimming and climbing bugs
      - Sigara comani
      - Sigara trillineata
      - Trichocorixa--swimming and climbing bugs
    - Family: Gerridae--water striders, pond skaters, wherrymen
      - Gerris sp.--skating bugs
      - Gerris remigis
    - Family: Naucoridae--creeping water bugs
      - Ambrysus mormon--clinging and swimming bugs
    - Family: Notonectidae#--back swimmers
    - Family: Saldidae*--shore bugs
    - Family: Veliidae#--broad-shouldered water striders
  - Suborder: Homoptera*--cicados, aphids, etc., semiaquatic bugs
- Order: Lepidoptera (LEP)--butterflies and moths
  - Family: Pyralidae--aquatic caterpillars
    - Parargyractis--silk retreat makers
- Order: Megaloptera (MEG)--alderflies, dobsonflies, and fishflies
  - Family: Sialidae*--alderflies
    - Sialis--burrowing, climbing, and clinging alderflies
  - Family: Corydalidae
  - Subfamily: Corydalinae#--dobsonflies and hellgrammites
  - Subfamily: Chauliodinae--fishflies
    - Dysmicohermes--clinging and climbing fishflies
- Order: Odonata (ODO)*--dragonflies and damselflies
- Suborder: Anisoptera (ANI)*--true dragonflies
  - Family: Aeshnidae--darners
    - Aeshna--climbing dragonflies
  - Family: Gomphidae*
    - Gomphus--burrowing dragonflies
    - Ophiogomphus--burrowing dragonflies
  - Family: Libellulidae*
    - Leucorrhinia--climbing dragonflies
  - Family: Petaluridae#--mountain dragonflies

*An asterisk denotes the collection of a higher taxa representative that could not be identified to the generic level.

L,A: These designations denote the larval and adult forms respectively.

#This designation denotes a generally lotic and/or relatively common higher taxa for which no representatives were collected from the study area streams.

Table B34. Continued (the fifth page of eight pages).

Class: Insecta--(continued)
- Order: Odonata (ODO)*--(continued)
  - Suborder: Zygoptera (ZYG)*--damselflies
    - Family: Calopterygidae (Agriidae)
      - Hetaerina--climbing and clinging damselflies
      - Hetaerina americana
    - Family: Coenagrionidae (Coenagriidae)*
      - Argia--clinging and climbing-sprawling damselflies
      - Argia (Hyponedra) vivida
      - Ischnura--climbing damselflies
  - Order: Plecoptera (PLE)--stoneflies
    - Family: Chloroperlidae*--clinging stoneflies
    - Family: Nemouridae*
      - Nemoura (a)--sprawling and clinging stoneflies
    - Family: Perlidae
      - Acroneuria (a)--clinging stoneflies
    - Family: Perlodidae*
      - Isogenus (a)--clinging stoneflies
      - Isoperla--clinging and sprawling stoneflies
    - Family: Pteronarcyidae#--clinging and sprawling stoneflies
      - Pteronarcys#--salmon flies ("helgrammites")
  - Order: Trichoptera (TRI)--caddisflies
    - Family: Brachycentridae*--tapered tube-case makers
      - Brachycentrus--clinging caddisflies
    - Family: Glossosomatidae*--saddle-case, turtle shell-case makers
      - Culoptila--clinging caddisflies
    - Family: Helicopsychidae--snail shell-like, tube-case makers
      - Helicopsyche--clinging caddisflies
    - Family: Hydropsychidae*--net spinning, fixed retreat makers
      - Cheumatopsyche--clinging caddisflies
      - Hydropsyche--clinging caddisflies
      - Potamyia--clinging caddisflies
    - Family: Hydroptilidae (L,P)*--microcaddisflies, purse-case makers
      - Hydroptila (L,P)--silken case, clinging caddisflies
      - Ithytrichia (L,P)--silken case, clinging caddisflies
      - Ochrotrichia--silken case, clinging caddisflies
    - Family: Lepidostomatidae#--climbing, sprawling tube-case makers

*An asterisk denotes the collection of a higher taxa representative that could not be identified to the generic level.

(a)These stonefly genera have numerous subgenera which are often given a generic rank by some "split-prone" authorities.

#This designation denotes a generally lotic and/or relatively common higher taxa for which no representatives were collected from the study area streams.

L,P: These designations denote the larval and pupal forms respectively.

Table 34B. Continued (the sixth page of eight pages).

Class: Insecta--(continued)
Order: Trichoptera (TRI)--(continued)
Family: Leptoceridae (L,P)*--variable tube-case makers
Nectopsyche (Leptocella)--climbing, swimming caddisflies with long and slender tube-cases
Oecetis--clinging, sprawling caddisflies with curved and tapered tube-cases
Family: Limnephilidae*--variable tube-case makers
Anabolia--climbing and sprawling caddisflies with rough tube-cases of plant pieces
Glyphopsyche--sprawling caddisflies with smooth tube-cases of plant pieces
Hesperophylax (Platyphylax) (L,P)--sprawling caddisflies with slightly curved and slightly coarse mineral tube-cases
Limnephilus--climbing and sprawling caddisflies with variable tube-cases of plant pieces and/or sand grain construction
Onocosmoecus--sprawling caddisflies with tube-cases of plant pieces or minerals
Psychoglypha--sprawling and clinging caddisflies with mixed tube-cases of plant pieces and minerals
Family: Odontoceridae#--sprawling tube-case makers
Family: Philopotamidae#--clinging sack-like, silk net spinners
Family: Phryganeidae--cylindrical tube-case makers
Ptilostomis--climbing caddisflies
Family: Polycentropodidae--net spinning retreat makers
Neureclipsis--clinging caddisflies with trumpet-shaped silk nets
Nyctiophylax--clinging caddisflies with silk tube retreats
Polycentropus--clinging caddisflies with silk tube retreats
Family: Rhyacophilidae#--free-living, free-ranging and clinging caddisflies having no cases

Phylum: Arthropoda--joint-footed animals
Subphylum: Mandibulata (Antennata)--antennae present
Class: Crustacea--crustaceans
Subclass: Ostracoda (OST)*--seed shrimp
Order: Podocopa*--fresh-water seed shrimp

*An asterisk denotes the collection of a higher taxa representative that could not be identified to the generic level.

L,P: These designations denote the larval and pupal forms respectively.

#This designation denotes a generally lotic and/or relatively common higher taxa for which no representatives were collected from the study area streams.

Table B34. Continued (the seventh page of eight pages).

Class: Crustacea--(continued)
Subclass: Malacostraca--lobsters, crabs, sow bugs, scuds, crayfishes, etc.
Order: Isopoda#--aquatic sow bugs
Order: Amphipoda (AMP)--scuds, sideswimmers, "fresh-water shrimp"
Family: Gammaridae
Gammarus
Family: Talitridae--common sideswimmer
Hyalella azteca--only Talitridae in North America
Order: Decapoda#--lobsters, crabs, crayfishes, etc.
Family: Astacidae#--crayfishes, crawfishes, crawdads

Phylum: Arthropoda--joint-footed animals
Subphylum: Chelicerata--antennae absent
Class: Arachnida (Arachnoidea)--spiders, scorpions, mites, ticks, etc.
Order: Acari (Acarina) (ACA)*--mites and ticks
Group: Hydracarina (Hydrachnellae)(b)*--water mites

Phylum: Annelida--segmented worms
Class: Hirudinea (HIR)*--leeches
Order: Gnathobdellida--no protrusible proboscis, five eye pairs
Family: Hirudinidae
Percymoorensis marmoratis
Order: Pharyngobdellida--no protrusible proboscis, three or four eye pairs
Family: Erpobdellidae*
Dina anoculata
Erpobdella
Order: Rhynchobdellida--protrusible proboscis present
Family: Glossiphoniidae*
Batracobdella
Glossiphonia sp.
Glossiphonia complanata
Helobdella sp.
Helobdella stagnalis
Placobdella sp.
Placobdella papillifera
Theromyzon#
Family: Piscicolidae#
Class: Oligochaeta (OLI)*--aquatic earthworms

#This designation denotes a generally lotic and/or relatively common higher taxa for which no representatives were collected from the study area streams.

*An asterisk denotes the collection of a higher taxa representative that could not be identified to the generic level.

(b)The Hydracarina is an artificial assemblage of several families in the acarian suborder Trombidiformes that are restricted to fresh-water habitats along with certain of the Sarcopotiformes and the Parasitiformes which also have an aquatic habit.

Table B34, Continued (the eighth page of eight pages).

Phylum: Mollusca--mollusks
Class: Gastropoda (GAS)*--univalve mollusks; limpets, snails and periwinkles
Subclass: Prosobranchia#--possess a gill and an operculum
Order: Mesogastropoda#--mostly marine species
Subclass: Pulmonata--possess a pulmonary sac (lung) and lack an operculum
Order: Basommatophora--fresh-water snails
Family: Ancylidae--cone snails
Ferrissia
Family: Lymnaeidae--pond snails
Lymnaea
Family: Planorbidae--orb snails
Gyraulus
Helisoma
Family: Physidae--pouch snails
Physa
Family: Pupillidae
Columnella
Class: Pelecypoda (PEL)*--bivalve mollusks; clams and mussels
Order: Eulamellibranchia
Family: Unionidae*--pearly mussels or naiads
Order: Heterodonta
Family: Sphaeriidae--pea, pill, and fingernail clams
Pisidium--anterior of shell longer than posterior
Sphaerium--posterior of shell longer than anterior

Phylum: Platyhelminthes--flatworms
Class: Turberbellaria (TUR)*--free-living flatworms

Phylum: Aschelminthes--roundworms
Class: Nematoda (NEM)(c)*--nematodes
Class: Nematomorpha (NMT)(c)*--"hair snakes" or "horsehair worms"
Order: Gordiida (Gordioidea)*--gordian worms

*An asterisk denotes the collection of a higher taxa representative that could not be identified to the generic level.

#This designation denotes a generally lotic and/or relatively common higher taxa for which no representatives were collected from the study area streams.

(c)The Nematoda and Nematomorpha are given a phylum rather than a class ranking by some authorities.

Table C35. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Rosebud Creek near Kirby during the 1978 sampling season.

Taxa/Collection Date	6/16	6/29	7/18	8/03	8/29	9/05	10/08	11/05
COL: Agabus (A)	--	--	--	--	--	1	--	--
Dubiraphia (L)	2	--	10	8	--	--	--	--
Dubiraphia (A)	--	--	2	--	--	--	--	--
Microcylloepus (L)	--	--	6	--	--	--	1	--
Microcylloepus (A)	--	--	--	--	2	--	--	--
Optioservus (L)	2	--	--	8	--	--	--	--
Optioservus divergens (A)	--	--	--	--	2	--	--	--
quadrimaculatus (A)	1	--	--	--	--	--	--	--
Hydrochus (L)	--	--	--	--	--	--	--	--
DIP: Bezzia-Probezzia	1	--	--	--	2	--	--	--
Chironomidae	39	19	572	2096	620	182	51	88
Clinocera-Chelifera	--	--	--	--	12t	--	--	--
Hemerodromia	--	--	2t	24t	8t	3t	--	--
Simulium (L)	4	2	--	--	4	--	2	6
Simulium (P)	1	--	--	--	--	--	--	--
Dicranota	1	--	--	--	--	--	--	--
Tipula	--	--	--	4	--	--	--	--
EPH: Baetis	42	4	18	8	82	5	1	26
Heptageniidae	--	--	--	--	4	--	--	--
Leptophlebiidae	--	--	--	--	2	--	--	--
Tricorythodes	--	--	10	4	--	2	7	3
MEG: Sialis	1	--	--	--	--	--	--	--
ANI: Anisoptera	--	--	--	--	--	--	--	--
Ophiogomphus	--	--	--	4	--	--	--	--
PLE: Perlodidae	--	--	--	--	--	--	--	--
Isogenus	--	--	--	--	--	--	6t	--
Isoperla	--	--	--	--	--	--	--	7
TRI: Brachycentrus	1	1	28	164	10	8	34	20
Cheumatopsyche	5	1	12	252	254	57	256	65
Hydropsyche	3	1	10	80	230	237	--	137
Hydroptila	20	--	224	108	12	1	3	18
Ochrotrichia	--	--	--	16	--	--	--	--
AMP: Hyalella azteca	1	--	--	--	--	--	--	1
ACA: Acari	1	--	18	--	34	--	--	5
HIR: Hirudinea	--	--	--	--	2	--	--	--
OLI: Oligochaeta	18	--	34	4	--	--	--	1
GAS: Ferrissia	--	--	--	--	--	--	1	1
Gyraulus	--	--	p	--	--	--	--	p
Physa	1	--	--	--	--	--	--	--
PEL: Pisidum	--	--	8	--	--	--	--	--
Totals	144	28	954	2780	1280	496	362	378

Table C36. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Rosebud Creek near Kirby during the 1979 sampling season.

Taxa/Collection Date	4/01	5/20	6/21	7/27	8/17	9/05	Two-Year Means
COL: Agabus (A)	--	--	--	--	--	--	0.1
Dubiraphia (L)	--	--	14	--	--	--	2.4
Dubiraphia (A)	--	--	--	--	--	--	0.1
Microcylloepus (L)	--	--	6	--	2	--	1.1
Microcylloepus (A)	--	--	--	4	2	12	1.4
Optioservus (L)	--	--	--	4	--	28	3.0
Optioservus divergens (A)	--	--	--	--	--	4	0.4
Optioservus quadrimaculatus (A)	--	--	--	--	--	--	0.1
Hydrochus (L)	--	--	2t	--	--	--	0.1t
DIP: Bezzia-Probezzia	--	2	--	--	--	--	0.4
Chironomidae	--	92	316	128	372	380	353.9
Clinocera-Chelifera	--	--	--	--	6t	8t	1.9t
Hemerodromia	--	--	2t	--	22t	8t	4.9t
Simulium (L)	--	--	20	--	--	--	2.7
Simulium (P)	--	--	--	--	--	--	0.1
Dicranota	--	--	--	--	--	--	0.1
Tipula	--	--	--	--	--	--	0.3
EPH: Baetis	1	5	16	4	98	20	23.6
Heptageniidae	--	--	--	--	--	--	0.3
Leptophlebiidae	--	--	--	--	4	--	0.4
Tricorythodes	--	--	32	16	50	36	11.4
MEG: Sialis	--	--	--	--	--	--	0.1
ANI: Anisoptera	--	--	2	--	--	--	0.1
Ophiogomphus	--	--	--	--	--	--	0.3
PLE: Perlodidae	--	--	2	--	--	--	0.1
Isogenus	--	--	--	--	--	--	0.4t
Isoperla	--	4	--	--	--	--	0.8
TRI: Brachycentrus	p	--	86	12	4	8	26.9
Cheumatopsyche	--	1	8	216	218	360	121.8
Hydropsyche	--	31	74	236	408	400	131.9
Hydroptila	--	5	24	72	34	12	38.1
Ochrotrichia	--	--	--	--	--	--	1.1
AMP: Hyalella azteca	--	--	--	--	--	--	0.1
ACA: Acari	--	--	4	4	--	16	5.9
HIR: Hirudinea	--	--	--	--	--	--	0.1
OLI: Oligochaeta	--	3	--	--	--	--	4.3
GAS: Ferrissia	--	--	--	--	--	--	0.1
Gyraulus	--	--	p	--	p	--	p
Physa	--	--	--	--	--	--	0.1
PEL: Pisidium	--	--	--	--	--	--	0.6
Totals	1	143	608	696	1220	1292	741.5 (10,382)

Table C37. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from middle Rosebud Creek near Colstrip and from lower Rosebud Creek near Rosebud.

Taxa/Collection Date	Rosebud-Colstrip 7/12/78	8/22/78	8/24/79	Means	Rosebud-Rosebud 11/07/79	Overall Means
COL: Curculionidae (L)	--	--	--	--	2	0.5
Hyperodes (L)	--	1	--	0.3	--	0.3
Dubiraphia (L)	2	8	--	3.3	--	2.5
Dubiraphia (A)	1	1	--	0.7	--	0.5
Microcylloepus (L)	3	25	2	10.0	4	8.5
Microcylloepus (A)	3	--	--	1.0	--	0.8
Microcylloepus pusillus (A)	--	1	--	0.3	--	0.3
Stenelmis (L)	2	9	2	4.3	--	3.3
Stenelmis sinuata (A)	1	--	--	0.3	--	0.3
Stenelmis vittipennis (A)	--	1	--	0.3	--	0.3
DIP: Chironomidae	6	43	4	17.7	362	103.8
Hemerodromia	1t	1t	--	0.7t	16t	4.5t
Simulium	25	--	1	8.7	226	63.0
Tipula	--	3	--	1.0	--	0.8
EPH: Baetis	4	9	3	5.3	--	4.0
Pseudocloeon	--	--	2	0.7	--	0.5
Choroterpes	1	1	--	0.7	30	8.0
Choroterpes-Leptophlebia	--	--	26	8.7	--	6.5
Paraleptophlebia	--	4	--	1.3	--	1.0
Ephoron	1	--	--	0.3	--	0.3
Tricorythodes	1	3	--	1.3	2	1.5
HEM: Ambrysus mormon (A)	1	3	9	4.3	--	3.3
LEP: Parargyractis	--	--	--	--	2	0.5
ANI: Ophiogomphus	1	--	--	0.3	--	0.3
TRI: Brachycentrus	--	8	3	3.7	--	2.8
Culoptila	--	--	--	--	2	0.5
Cheumatopsyche	2	105	29	45.3	130	66.5
Hydropsyche	20	23	4	15.7	334	95.3
Hydroptila	--	--	--	--	10	2.5
Ithytrichia	--	1	--	0.3	--	0.3
ACA: Acari	--	1	--	0.3	--	0.3
HIR: Hirudinea	--	--	1	0.3	--	0.3
OLI: Oligochaeta	4	5	--	3.0	--	2.3
GAS: Ferrissia	p	--	--	p	--	p
Physa	--	1	--	0.3	2	0.8
PEL: Sphaerium	4	--	--	1.3	--	1.0
TUR: Turbellaria	--	11	--	3.7	--	2.8
Totals	83	268	86	145.4 (437)	1122	390.7 (1559)

Table C38. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Indian Creek near Kirby.

	1978 Samples			1979 Samples			
Taxa/Collection Date	7/25	8/24	11/05	6/26	7/17	9/28	Means
COL: Agabus (L)	--	--	--	2	--	--	0.3
Dubiraphia (L)	--	1	2	2	--	--	0.8
Dubiraphia (A)	--	1	1	--	--	--	0.3
Microcylloepus (L)	7	--	--	2	4	8	3.5
Microcylloepus (A)	--	--	--	--	4	8	2.0
Microcylloepus pusillus (A)	--	--	--	4	--	--	0.7
Optioservus (L)	61	21	36	56	4	184	60.3
Optioservus (A)	28	--	--	--	--	--	4.7
Optioservus divergens (A)	--	--	4	18	--	8	5.0
quadrimaculatus (A)	--	--	--	6	--	--	1.0
Heteroceridae (L)	1t	--	--	--	--	--	0.2
Berosus (L)	--	--	--	--	4	--	0.7
DIP: Bezzia-Probezzia	--	--	1	--	--	--	0.2
Chironomidae	60	113	102	134	2928	288	604.2
Clinocera-Chelifera	--	10t	6t	--	8t	4t	4.7t
Hemerodromia	3t	2t	1t	--	12t	12t	5.0t
Muscidae	--	--	--	--	12	--	2.0
Pericoma	--	--	1	--	16	--	2.8
Simulium	4	--	2	2	272	--	46.7
Euparyphus	--	--	1	--	--	--	0.2
Tipulidae	--	--	--	--	--	4	0.7
Dicranota	4	--	6	--	84	8	17.0
Tipula	2	--	2	2	--	--	1.0
EPH: Baetidae	--	--	--	p	--	--	p
Baetis	47	1	1	--	--	12	10.2
Caenis	6	--	54	--	--	--	10.0
Tricorythodes	--	3	1	--	--	--	0.7
ANI: Ophiogomphus	--	5	2	--	--	--	1.2
PLE: Isoperla	--	1t	1	--	--	--	0.3
TRI: Brachycentrus	296	13	16	14	--	136	79.2
Cheumatopsyche	49	5	--	2	3604	372	672.0
Hydropsyche	54	52	131	40	368	932	262.8
Potamyia	1	--	--	--	--	--	0.2
Hydroptila	16	7	82	32	44	44	37.5
Ochrotrichia	4	--	--	--	--	--	0.7
Oecetis	--	3	--	--	--	--	0.5
Onocosmoecus	--	--	--	2	--	--	0.3
AMP: Gammarus	--	--	--	--	--	4	0.7
Hyalella azteca	34	6	--	2	--	4	7.7
ACA: Acari	1	19	23	28	36	40	24.5
OLI: Oligochaeta	14	2	2	8	--	8	5.7
GAS: Lymnaea	1	--	--	--	--	--	0.2
Gyraulus	p	p	34	p	p	p	5.7
Physa	--	--	--	p	--	--	p
Columnella	--	--	p	--	--	--	p
PEL: Pisidium	3	--	--	p	--	--	0.5
Totals	696	265	512	356	7400	2076	1884.6 (11,305)

Table C39. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Davis Creek near Busby.

Taxa/Collection Date	6/26/78	7/25/78	8/24/79	Means
COL: Agabus (L)	1	1	--	0.7
Agabus (A)	--	--	1	0.3
Deronectes-Oerodytes (A)	1	--	--	0.3
Deronectes liodessus (A)	--	1	--	0.3
Hydroporus-Hygrotus (L)	--	1t	--	0.3t
Dubiraphia (L)	9	25	10	14.7
Dubiraphia (A)	14	3	--	5.7
Dubiraphia vittata (A)	--	--	26	8.7
Gyrinis-Gyretes (L)	--	1t	--	0.3t
Limnichidae (L)	1	--	--	0.3t
DIP: Bezzia-Probezzia	--	3	--	1.0
Chironomidae	39	878	233	383.3
Clinocera-Chelifera	--	11t	--	3.7t
Simulium	3	27	--	10.0
Stratiomyidae	--	1	--	0.3
Odontomyia	1	--	--	0.3
Chrysops	--	1	--	0.3
Tabanus	--	--	1	0.3
Tipula	1	--	--	0.3
EPH: Baetis	5	5	4	4.7
Caenis	2	9	7	6.0
HEM: Heteroptera (L)	1t	--	--	0.3t
Heteroptera (A)	1t	--	--	0.3t
Hesperocorixa laevigata (A)	--	19	--	6.3
MEG: Sialis	1	17	2	6.7
ZYG: Coenagrionidae	--	--	2	0.7
Ischnura	--	1	--	0.3
TRI: Cheumatopsyche	16	1	151	56.0
Hydroptila	1	--	--	0.3
Hesperophylax	--	1	22	7.7
Limnephilus	--	1	--	0.3
Ptilostomis	--	--	1	0.3
AMP: Hyalella azteca	14	17	37	22.7
OST: Ostracoda	2	--	5	2.3
ACA: Acari	2	--	2	1.3
HIR: Glossiphonia	1	--	--	0.3
OLI: Oligochaeta	3	7	4	4.7
GAS: Gyraulus	p	p	--	p
Physa	1	23	4	9.3
Totals	120	1054	512	561.6 (1686)

Table C40. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Muddy Creek near Busby-Lame Deer.

Taxa/Collection Date	6/26/78	7/25/78	5/20/79	8/24/79	Means
COL: Dubiraphia (L)	--	--	43	22	16.3
Dubiraphia (A)	--	1	1	--	0.5
Microcylloepus (L)	--	--	--	8	2.0
Optioservus (L)	--	--	3	--	0.8
DIP: Bezzia-Probezzia	1	--	--	--	0.3
Chironomidae	235	112	70	250	166.8
Simulium	2	43	--	14	14.8
Dicranota	--	12	--	--	3.0
EPH: Baetis	--	46	--	22	17.0
Caenis	42	3	13	--	14.5
Choroterpes	--	--	--	2	0.5
HEM: Ambrysus mormon (A)	--	--	2	30	8.0
TRI: Brachycentrus	--	3	--	--	0.8
Cheumatopsyche	9	444	30	150	158.3
Hydropsyche	--	9	4	2	3.8
Hydroptila (L)	--	14	58	10	20.5
Hydroptila (P)	2	--	--	--	0.5
Oecetis	--	--	p	2	0.5
Onocosmoecus	--	--	1	--	0.3
AMP: Hyalella azteca	2	--	9	310	80.3
ACA: Acari	--	--	18	2	5.0
HIR: Glossiphonia complanata	--	--	1	--	0.3
Helobdella	--	--	7	24	7.8
Helobdella stagnalis	--	--	17	--	4.3
OLI: Oligochaeta	3	--	3	16	5.5
Lymnaea	--	--	p	--	p
Gyraulus	--	p	p	p	p
Helisoma	--	--	p	--	p
Physa	5	--	p	10	3.8
PEL: Pisidium	--	--	26	8	8.5
NEM: Nematoda	--	--	--	6	1.5
Totals	301	687	306	888	546.2 (2182)

Table C41. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Lame Deer Creek near Lame Deer.

Taxa/Collection Date	7/12/78	8/16/78	8/07/79	11/06/79	Means
COL: Dubiraphia (L)	--	1	--	4	1.3
Dubiraphia vittata (A)	--	--	26	--	6.5
Microcylloepus (L)	--	--	2	--	0.5
Optioservus (L)	40	4	48	8	25.0
Optioservus (A)	20	--	--	--	5.0
Optioservus divergens (A)	--	--	2	--	0.5
Haliplus (L)	--	--	2	--	0.5
DIP: Chironomidae	204	44	92	1012	338.0
Clinocera-Chelifera	--	2t	--	--	0.5t
Hydrellia	16	1	--	--	4.3
Simulium	20	1	2	604	156.8
Dicranota	8	--	--	--	2.0
EPH: Baetis	8	--	--	20	7.0
Caenis	--	--	2	--	0.5
Ameletus	--	--	--	4t	1.0t
HEM: Gerris (A)	--	3	--	--	0.8
ZYG: Ischnura	--	--	8	16	6.0
TRI: Brachycentrus	232	24	--	--	64.0
Cheumatopsyche	216	2	60	2272	637.5
Hydropsyche	4	5	4	232	61.3
Hydroptila	--	--	68	12	20.0
Oecetis	--	--	16	--	4.0
Glyphopsyche	--	2	--	--	0.5
Hesperophylax	24	--	--	--	6.0
AMP: Gammarus	72	--	64	--	34.0
Hyallela azteca	84	2	508	52	161.5
ACA: Acari	4	2	4	--	2.5
HIR: Erpobdellidae	--	--	22	--	5.5
Glossiphonia	--	--	6	--	1.5
Helobdella stagnalis	--	--	4	--	1.0
OLI: Oligochaeta	--	1	--	--	0.3
GAS: Helisoma	--	--	4	--	1.0
Physa	8	5	p	--	3.3
PEL: Pisidium	4	4	4	--	3.0
Totals	964	103	948	4236	1563.1 (6251)

Table C42. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Tongue River near Sheridan-Decker.

Taxa/Collection Date	7/07/78	8/26/78	6/26/79	8/30/79	Means
COL:Dubiraphia (A)	--	--	1	--	0.3
Microcylloepus (L)	1	1	5	180	46.8
Microcylloepus (A)	--	--	4	--	1.0
Microcylloepus pusillus (A)	--	--	--	24	6.0
Stenelmis (L)	3	1	1	4	2.3
Stenelmis sinuata (A)	--	--	--	8	2.0
Stenelmis vittipennis (A)	--	--	2	--	0.5
Zaitzevia parvula (A)	--	--	1t	--	0.3t
DIP:Bezzia-Probezzia	--	--	3	--	0.8
Bezzia-Probezzia-Palpomyia	5	--	--	--	1.3
Chironomidae	48	80	299	184	152.8
Hermerodromia	--	--	1t	--	0.3t
Simulium (L)	17	62	29	92	50.0
Simulium (P)	--	11	--	--	2.8
EPH:Baetis	101	32	30	220	95.8
Pseudocloeon	9	--	1	16	6.5
Ephemera	1	--	--	--	0.3
Ephemerella	11	--	66	--	19.3
Heptageniidae	--	--	--	4	1.0
Rithrogena	--	1	--	--	0.3
Stenonema	--	1	--	--	0.3
Leptophlebiidae	--	1	--	--	0.3
Choroterpes-Leptophlebia	--	--	--	4	1.0
Ephoron	--	2	--	--	0.5
Tricorythodes	6	11	3	2	5.5
LEP:Parargyractis	--	--	1	20	5.3
Ophiogomphus	--	--	--	4	1.0
PLE:Isoperla	--	--	9	--	2.3
TRI:Brachycentrus	--	--	71	4	18.8
Helicopsyche	--	--	--	24	6.0
Cheumatopsyche	108	32	35	356	132.8
Hydropsyche	4	84	310	388	196.5
Hydroptila	--	6	p	24	7.5
Ochrotrichia	--	1	--	16	4.3
Nectopsyche	--	1	--	--	0.3
Oecetis	2	--	1	44	11.8
OLI:Oligochaeta	30	--	1	--	7.8
GAS:Gyraulus	p	--	--	--	p
PEL:Pisidium	2	--	--	--	0.5
Sphaerium	--	--	--	p	p
TUR:Turbellaria	--	--	--	112	28.0
Totals	348	327	874	1730	820.9 (3279)

Table C43. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Ash and Youngs Creeks near Sheridan-Decker.

	Ash Creek				Youngs Creek		
	1978	1979			1979		
Taxa/Collection Date	6/10	7/26	8/30	Means	7/13	8/30	Means
COL: Dubiraphia (L)	--	16	--	5.3	2	--	1.0
Dubiraphia (A)	--	--	--	--	--	2	1.0
Microcylloepus (L)	--	4	--	1.3	3	--	1.5
Microcylloepus (A)	--	4	--	1.3	--	--	--
Microcylloepus pusillus (A)	--	--	--	--	1	--	0.5
Optioservus (L)	--	--	4	1.3	3	--	1.5
DIP: Bezzia-Probezzia	--	24	--	8.0	--	--	--
Chironomidae	13	1664	456	711.0	21	290	155.5
Clinocera-Chelifera	--	12t	--	4.0t	1t	--	0.5t
Hemerodromia	--	--	--	--	--	4t	2.0t
Muscidae	--	52	4	18.7	--	--	--
Simulium	1	132	64	65.7	1	12	6.5
Dicranota	--	40	40	26.7	--	--	--
Tipula	2	--	--	0.7	--	--	--
EPH: Baetis	6	184	72	87.3	9	--	4.5
Pseudocloeon	1	12	--	4.3	--	--	--
Leptophlebiidae	--	--	p	p	--	--	--
Tricorythodes	--	--	--	--	--	2	1.0
ANI: Ophiogomphus	1	--	--	0.3	--	2	1.0
PLE: Perlodidae	--	--	4	1.3	--	--	--
TRI: Brachycentrus	--	8	--	2.7	2	6	4.0
Cheumatopsyche	1	224	172	132.3	62	130	96.0
Hydropsyche	13	316	376	235.0	83	190	136.5
Hydroptila	--	48	12	20.0	18	6	12.0
Ochrotrichia	--	--	8	2.7	2	--	1.0
Oecetis	--	p	--	p	--	--	--
Onocosmoecus	--	4	--	1.3	2	--	1.0
ACA: Acari	--	12	--	4.0	--	--	--
OLI: Oligochaeta	1	--	--	0.3	2	--	1.0
GAS: Lymnaea	--	--	--	--	p	--	p
Gyraulus	--	--	--	--	--	p	p
Physa	--	20	4	8.0	p	4	2.0
PEL: Pisidium	--	--	--	--	--	p	p
Totals	39	2776	1216	1343.5 (4031)	212	648	430.0 (860)

Table C44. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Tongue River near Pyramid Butte-Birney during the 1978 sampling season (the first page of two pages).

Taxa/Collection Date	6/28	7/19	8/03	8/24	9/05	10/08	11/04
COL: Dubiraphia (L)	2	2	1	--	--	--	2
Dubiraphia (A)	1	--	--	1	56	1	--
Dubiraphia vittata (A)	--	--	--	--	--	--	--
Microcylloepus (L)	41	--	3	26	488	193	4
Microcylloepus (A)	4	--	10	1	1232	461	32
Microcylloepus pusillus (A)	--	--	--	--	--	--	--
Stenelmis (L)	--	--	2	1	176	11	2t
Stenelmis (A)	--	5	5	1	24	--	2
Stenelmis sinuata (A)	--	--	--	--	--	--	--
Stenelmis vittipennis (A)	--	--	--	--	--	--	--
Heteroceridae (L)	--	--	--	--	--	--	--
DIP: Brachycera	--	--	--	1	--	--	--
Ceratopogonidae	--	1	5	--	--	--	--
Bezzia-Probezzia	--	--	6	--	--	4	--
Bezzia-Probezzia-Palpomyia	--	--	--	1	--	--	--
Chironomidae	102	66	381	253	408	148	172
Hemerodromia	--	--	--	--	--	7t	2t
Simulium	79	23	1	1	48	79	456
Dicranota	--	--	--	--	--	--	--
EPH: Baetidae	--	--	--	--	448	--	--
Baetis	22	39	15	10	680	176	100
Pseudocloeon	--	--	--	--	--	--	--
Ephemera	--	--	--	--	--	--	--
Ephemerella	6	3	--	--	--	227	90
Heptageniidae	--	--	--	--	16	--	8t
Heptagenia	--	--	--	--	--	4	--
Stenonema	--	--	--	2	--	--	10
Leptophlebiidae	--	--	--	--	--	--	--
Choroterpes	--	2t	33	43	--	--	--
Leptophebia	--	--	--	--	16	--	--
Choroterpes-Leptophlebia	--	--	--	--	136	3	--
Siphlonurus	--	--	--	--	--	--	--
Tricorythodes	17	19	68	43	16	32	16
HEM: Homoptera (L)	--	--	--	--	--	--	--
Ambrysus mormon (A)	--	--	p	1	--	--	--
LEP: Paragyractis	--	--	--	2	--	--	--
ANI: Gomphus	--	--	--	--	--	--	--
Ophiogomphus	--	--	--	1	--	--	--
PLE: Acroneuria	--	--	--	1	--	--	--
Perlodidae	--	--	--	--	80	356	44
Isoperla	--	--	--	2	--	--	--

Table C44. Continued (the second page of two pages).

Taxa/Collection Date	6/28	7/19	8/03	8/24	9/05	10/08	11/04
TRI:Helicopsyche	--	--	--	--	--	--	--
Cheumatopsyche	--	10	10	9	56	13	24
Hydropsyche	--	--	22	30	192	59	252
Hydroptilidae (L)	--	--	--	--	--	--	--
Hydroptilidae (P)	--	--	--	--	--	--	--
Hydroptila	--	--	4	5	48	7	12
Ochrotrichia	--	--	--	--	24	--	--
Glossosomatidae	--	--	--	1t	--	--	--
Leptoceridae (L)	--	--	--	3	--	--	--
Leptoceridae (P)	--	--	--	1	--	--	--
Nectopsyche	3	--	6	62	200	39	40
Oecetis	--	--	--	8	--	7	26
OST:Ostracoda	--	--	1	--	--	--	--
ACA:Acari	--	--	--	--	--	--	2
OLI:Oligochaeta	--	--	--	--	--	--	--
GAS:Gastropoda	--	--	--	--	--	--	--
Ferrissia	--	--	--	--	--	--	--
Physa	--	--	--	--	--	--	--
Columnella	--	--	--	--	--	--	--
PEL:Pelecypoda	--	--	--	--	--	--	--
Pisidium	--	--	--	--	--	--	--
TUR:Turbellaria	--	--	--	--	144	51	40
Totals	277	170	573	510	4488	1878	1336

Table C45. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Tongue River near Pyramid Butte-Birney during the 1979 sampling season (the first page of two pages).

Taxa/Collection Date	3/31	5/19	6/21	8/01	8/18	9/05	Two-Year Means
COL: Dubiraphia (L)	--	--	4	4	8	4	2.1
Dubiraphia (A)	--	--	--	--	--	--	4.5
Dubiraphia vittata (A)	--	--	--	--	4	--	0.3
Microcylloepus (L)	32	8	16	204	472	748	171.9
Microcylloepus (A)	--	18	--	--	--	--	135.2
Microcylloepus pusillus (A)	28	--	32	200	360	352	74.8
Stenelmis (L)	--	--	--	32	36	36	22.8
Stenelmis (A)	--	--	--	16	--	--	4.1
Stenelmis sinuata (A)	--	11	4	--	--	--	1.2
Stenelmis vittipennis (A)	--	--	--	--	12	20	2.5
Heteroceridae (L)	--	--	--	2	--	--	0.2
DIP: Brachycera	--	--	--	--	--	--	0.1
Ceratopogonidae	--	--	--	--	--	--	0.5
Bezzia-Probezzia	--	1	44	--	--	--	4.2
Bezzia-Probezzia-Palpomyia	2	--	--	--	--	--	0.2
Chironomidae	568	102	1320	224	100	88	302.5
Hemerodromia	--	--	--	12t	--	--	1.6t
Simulium	52	5	20	36	28	4	64.0
Dicranota	--	--	--	4	--	--	0.3
EPH: Baetidae	--	--	--	--	--	--	34.5
Baetis	72	12	236	72	72	36	118.6
Pseudocloeon	--	--	--	12t	--	--	0.9t
Ephemera	--	--	4	--	--	--	0.3
Ephemerella	168	84	16	8	--	--	46.3
Heptageniidae	4	--	--	--	--	--	2.2
Heptagenia	--	--	8	--	--	--	0.9
Stenonema	--	3	--	--	--	--	1.2
Leptophlebiidae	--	--	4	--	--	--	0.3
Choroterpes	--	1	--	8	--	32	9.2
Leptophlebia	--	--	--	--	--	--	1.2
Choroterpes-Leptophlebia	--	--	--	160	24	--	24.8
Siphlonurus	--	--	4t	--	--	--	0.3t
Tricorythodes	12	1	144	36	4	4	31.7
HEM: Homoptera (L)	--	--	--	2	--	--	0.2
Ambrysus mormon (A)	--	--	--	16	8	12	2.8
LEP: Parargyractis	--	--	--	24	4	--	2.3
ANI: Gomphus	--	--	--	--	4	--	0.3
Ophiogomphus	--	--	--	--	--	--	0.1
PLE: Acroneuria	--	--	--	2	--	--	0.2
Perlodidae	124	--	--	--	--	--	46.5
Isoperla	--	50	--	--	--	--	4.0

Table C45. Continued (the second page of two pages).

Taxa/Collection Date	3/31	5/19	6/21	8/01	8/18	9/05	Two-Year Means
TRI:Helicopsyche	--	--	4	--	20	64	6.8
Cheumatopsyche	--	3	8	36	40	20	17.6
Hydropsyche	46	11	12	588	192	220	124.9
Hydroptilidae (L)	--	--	--	--	356	p	27.4
Hydroptilidae (P)	--	--	92	--	--	--	7.1
Hydroptila	--	9	16	96	220	4	32.4
Ochrotrichia	--	--	24	8	136	4	15.1
Glossosomatidae	--	--	--	--	--	--	0.1t
Leptoceridae (L)	--	--	--	--	--	--	0.2
Leptoceridae (P)	--	--	--	--	--	--	0.1
Nectopsyche	22	3	--	12	60	76	40.2
Oecetis	6	--	12	8	20	44	10.1
OST:Ostracoda	--	--	--	--	--	--	0.1
ACA:Acari	--	--	4	4	4	--	1.1
OLI:Oligochaeta	--	--	12	--	8	--	1.5
GAS:Gastrapoda	--	--	--	--	--	p	p
Ferrissia	--	--	--	p	--	--	p
Physa	2	p	8	40	68	12	10.0
Columnella	--	--	--	--	--	pt	pt
PEL:Pelecypoda	--	--	p	--	--	--	p
Pisidium	--	--	--	2	--	--	0.2
TUR:Turbellaria	2	--	12	--	28	96	28.7
Totals	1140	322	2060	1868	2288	1876	1445.4 (18,786)

Table C46. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Squirrel Creek near Decker.

	1978 Samples		1979 Samples							
Taxa/Collection Date	6/10	8/26	4/01	5/20	6/21	7/26	8/17	9/05	11/06	Means
COL: Helichus (A)	--	--	--	--	--	2	--	--	--	0.2
Helichus striatus (A)	1	--	--	--	--	--	--	--	--	0.1
Dubiraphia (L)	--	4	88	3	144	58	8	20	12	37.4
Dubiraphia vittata (A)	--	8	8	--	--	--	--	--	--	1.8
Microcylloepus (L)	--	8	4	--	4	--	8	8	--	3.6
Microcylloepus (A)	--	--	--	--	--	4	--	8	--	1.3
Stenelmis vittipennis (A)	--	4	--	--	--	--	--	--	--	0.4
Optioservus (L)	--	16	40	3	12	102	56	96	8	37.0
Optioservus divergens (A)	1	16	--	6	--	--	8	8	--	4.3
quadrimaculatus (A)	--	4	8	--	16	--	4	4	--	4.0
DIP: Bezzia-Probezzia	--	20	--	2	--	4	--	16	--	4.7
Bezzia-Probezzia-Palpomyia	--	--	12	--	12	--	8	--	--	3.6
Palpomyia	--	--	16	--	16	--	--	--	--	3.6
Culicoides	1	--	--	--	--	--	--	--	--	0.1
Chironomidae	40	2500	324	48	3024	1108	1848	2356	1268	1390.7
Hemerodromia	--	48t	12t	--	--	90t	24t	48t	--	24.7t
Limnophora	--	--	4t	--	--	--	--	--	--	0.4t
Simulium	1	36	8	--	--	8	--	88	24	18.3
Dicranota	--	--	2	--	--	2	--	--	4	0.9
Tipula	--	--	1	--	4	--	--	--	--	0.6
EPH: Baetidae	--	--	--	--	12	--	--	--	--	1.3
Baetis	2	8	4	--	--	--	--	--	--	1.6
Caenis	1	--	--	--	--	--	--	--	--	0.1
Leptophlebiidae	--	--	--	--	--	--	--	--	4	0.4
HEM: Ambrysus mormon (A)	--	32	--	--	4	8	--	--	--	4.9
LEP: Parargyractis	--	--	--	--	--	--	4	20	--	2.7
ANI: Gomphidae	p	--	--	--	--	--	--	--	--	p
TRI: Brachycentrus	--	--	--	--	16	6	--	4	--	2.9
Cheumatopsyche	1	1792	768	32	96	790	888	2416	448	803.4
Hydropsyche	1	1580	220	141	244	2124	2880	2516	484	1132.2
Hydroptila	--	108	--	2	12	30	4	24	--	20.0
Ochrotrichia	--	--	--	--	4	--	8	--	--	1.3
AMP: Hyalella azteca	--	16	--	--	--	--	--	--	--	1.8
OST: Ostracoda	--	--	--	--	--	--	--	p	--	p
ACA: Acari	1	176	4	--	4	20	4	4	16	25.4
OLI: Oligochaeta	16	--	--	4	--	--	4	--	--	2.7
GAS: Gyraulus	p	--	--	--	--	--	p	--	--	p
Physa	p	12	p	p	--	p	p	p	--	1.3
NEM: Nematoda	--	--	--	--	12	--	--	8	--	2.2
Totals	66	6388	1523	241	3636	4356	5756	7644	2268	3541.9 (31,878)

Table C47. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Deer Creek near Decker and from Canyon Creek near Decker-Birney.

	Deer Creek				Canyon Creek			
	1978		1979		1979			
Taxa/Collection Date	6/10	8/15	11/05	Means	6/26	7/27	8/30	Means
COL: Agabus (L)	1	--	--	0.3	--	--	--	--
Agabus (A)	1	--	--	0.3	--	--	--	--
Dubiraphia (L)	--	--	--	--	--	--	26	8.7
Microcylloepus (L)	--	--	--	--	8	8	2	6.0
Microcylloepus (A)	--	--	--	--	--	4	--	1.3
Haliplus (L)	--	--	--	--	--	--	14	4.7
Berosus (L)	--	--	--	--	--	--	2	0.7
DIP: Bezzia-Probezzia	--	--	12	4.0	2	6	4	4.0
Bezzia-Probezzia-Palpomyia	--	4	--	1.3	--	--	--	--
Palpomyia	--	--	4	1.3	--	--	--	--
Chironomidae	4	66	204	91.3	24	12	76	37.3
Muscidae	--	--	--	--	--	--	4	1.3
Simulium (L)	2	1	--	1.0	132	88	2	74.0
Simulium (P)	--	--	--	--	186	32	--	72.7
Stratiomyidae	--	--	--	--	p	--	--	p
Euparyphus	--	--	--	--	4	44	32	26.7
Stratiomys	--	1	2	1.0	--	--	--	--
Tabanus	--	--	4	1.3	--	--	--	--
Tipulidae	--	--	4	1.3	--	--	--	--
Ormosia	--	--	40	13.3	--	--	--	--
EPH: Baetidae	--	--	--	--	--	2	12	4.7
Baetis	--	--	--	--	6	--	--	2.0
Caenis	1	--	--	0.3	--	--	2	0.7
Leptophlebiidae	--	--	--	--	--	2	--	0.7
Tricorythodes	--	--	--	--	2	--	--	0.7
HEM: Heteroptera (L)	--	1	--	0.3	--	--	--	--
Trichocorixa (A)	--	1	--	0.3	--	--	--	--
ANI: Aeshna	--	1	--	0.3	--	--	--	--
Ophiogomphus	--	--	--	--	--	--	2	0.7
ZYG: Coenagrionidae	1	--	--	0.3	--	--	6	2.0
Argia	--	12	--	4.0	--	--	12	4.0
Ischnura	--	7	--	2.3	--	--	--	--
TRI: Cheumatopsyche	--	1	--	0.3	100	68	22	63.3
Hydropsyche	--	--	--	--	2	18	2	7.3
Ithytrichia	--	--	--	--	--	2	--	0.7
Limnephilus	12	--	40	17.3	--	--	--	--
AMP: Hyalella azteca	4	26	--	10.0	4	2	32	12.7
OST: Ostracoda	--	--	--	--	--	4	2	2.0
ACA: Acari	--	2	--	0.7	4	2	--	2.0
HIR: Hirudinea	--	--	--	--	2	--	--	0.7
OLI: Oligochaeta	1	10	12	7.7	--	--	2	0.7
GAS: Lymnaea	6	--	p	2.0	--	--	--	--
Gyraulus	1	--	--	0.3	--	--	--	--
Physa	4	9	p	4.3	16	6	2	8.0
TUR: Turbellaria	--	--	--	--	--	2	16	6.0
Totals	38	142	322	166.8 (502)	492	302	274	356.3 (1068)

Table C48. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Prairie Dog and Bull Creeks near Pyramid Butte-Birney.

	Prairie Dog Creek			Bull Creek		
Taxa/Collection Date	7/12/79	8/30/79	Means	7/12/79	8/30/79	Means
COL:Agabus (A)	2	--	1.0	--	--	--
Dubiraphia (L)	--	--	--	8	--	4.0
Dubiraphia (A)	--	--	--	4	--	2.0
Microcylloepus (L)	2	--	1.0	--	--	--
Optioservus (L)	--	14	7.0	--	--	--
DIP:Bezzia-Probezzia	--	--	--	--	2	1.0
Hemerodromia	4t	--	2.0t	8t	2t	5.0t
Chironomidae	70	10	40.0	32	388	210.0
Simulium	6	2	4.0	76	2	39.0
EPH:Baetis	16	18	17.0	64	24	44.0
Caenis	2	2	2.0	--	--	--
Leptophlebia	--	2	1.0	--	--	--
Tricorythodes	--	--	--	--	6	3.0
HEM:Gerris remigis (A)	2	--	1.0	--	--	--
LEP:Parargyractis	--	--	--	--	6	3.0
ZYG:Argia	--	16	8.0	--	2	1.0
TRI:Brachycentrus	--	--	--	12	2	7.0
Cheumatopsyche	92	34	63.0	212	136	174.0
Hydropsyche	50	40	45.0	312	406	359.0
Hydroptila	12	30	21.0	--	--	--
AMP:Hyalella azteca	28	26	27.0	--	--	--
ACA:Acari	--	--	--	4	2	3.0
GAS:Gyraulus	--	--	--	--	2	1.0
Physa	44	112	78.0	--	2	1.0
Totals	330	306	318.0 (636)	732	982	857.0 (1714)

Table C49. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Cook Creek near Birney-Birney Village.

Taxa/Collection Date	6/11/78	8/24/78	9/05/79	Means
COL: Agabus (L)	3	4	--	2.3
Helichus striatus (A)	--	--	2	0.7
Dubiraphia (L)	--	--	2	0.7
Dubiraphia vittata (A)	--	--	10	3.3
Microcylloepus (L)	--	--	2	0.7
Haliplus (L)	--	--	4	1.3
Ochthebius (L)	--	--	2	0.7
DIP: Bezzia-Probezzia	--	12	--	4.0
Palpomyia	--	8	--	2.7
Chironomidae	171	2756	148	1025.0
Muscidae	--	12	--	4.0
Pericoma	--	8	--	2.7
Simulium	139	408	2	183.0
Nemotelus	--	--	2t	0.7t
Tipula	1	8	--	3.0
EPH: Baetis	--	32	--	10.7
Caenis	--	--	2	0.7
HEM: Sigara comani (A)	--	--	16t	5.3t
ZYG: Argia	--	4	--	1.3
TRI: Cheumatopsyche	--	548	568	372.0
Hydropsyche	--	--	2	0.7
Hydroptila	--	48	--	16.0
AMP: Hyalella azteca	--	8	36	14.7
ACA: Acari	--	4	2	2.0
HIR: Glossiphonia complanata	--	--	4	1.3
OLI: Oligochaeta	11	80	4	31.7
GAS: Gyraulus	--	--	2	0.7
Physa	--	--	10	3.3
PEL: Pisidium	--	--	4	1.3
NMT: Nematomorpha	1	--	--	0.3
Totals	326	3940	824	1696.8 (5090)

Table C50. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Logging Creek near Ashland.

Taxa/Collection Date	6/27/78	8/16/78	9/06/79	Means
COL: Listronotus (L)	1	--	--	0.3
Dubiraphia (L)	1	428	144	191.0
Dubiraphia (A)	11	4	14	9.7
DIP: Ceratopogonidae	2	--	--	0.7
Bezzia-Probezzia-Palpomyia	--	--	24	8.0
Chironomidae	20	124	56	66.7
Psychodidae	--	--	2	0.7
Simulium	9	28	14	17.0
Tabanus	--	4	2	2.0
Pseudolimnophilia	1t	--	--	0.3t
Tipula	1	8	28	12.3
EPH: Baetis	9	--	--	3.0
Caenis	4	20	6	10.0
HEM: Heteroptera (L)	1	--	--	0.3
MEG: Dysmicohermes	1	--	--	0.3
Sialidae	--	12	--	4.0
Sialis	1	--	--	0.3
ANI: Aeshna	--	4	2	2.0
ZYG: Ischnura	--	12	--	4.0
TRI: Cheumatopsyche	24	4	168	65.3
Hydropsyche	--	--	2	0.7
Hydroptila	3	4	--	2.3
Ptilostomis	--	8	--	2.7
AMP: Hyalella azteca	--	--	2	0.7
OST: Ostracoda	--	--	2	0.7
ACA: Acari	1	4	8	4.3
HIR: Hirudinea	1	--	--	0.3
Glossiphonia	--	4	--	1.3
OLI: Oligochaeta	2	--	--	0.7
GAS: Gastropoda	--	--	p	p
Lymnaea	--	--	p	p
Gyraulus	--	--	p	p
Physa	--	p	24	8.0
Columnella	--	--	pt	pt
PEL: Pisidium	--	60	30	30.0
NEM: Nematoda	1	--	2	1.0
Totals	94	728	530	450.6 (1352)

Table C51. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Beaver Creek near Brandenberg.

Taxa/Collection Date	7/13/78	9/03/78	10/09/78	7/12/79	8/24/79	Means
COL: Dubiraphia (L)	--	--	16	2	8	5.2
Microcylloepus pusillus (A)	--	4	--	--	--	0.8
Haliplus (L)	--	--	--	--	12	2.4
Haliplus (A)	--	--	--	2	8	2.0
DIP: Bezzia-Probezzia	--	4	4	--	--	1.6
Bezzia-Probezzia-Palpomyia	--	--	--	4	--	0.8
Chironomidae	166	420	208	250	244	257.6
Clinocera-Chelifera	1t	--	--	--	--	0.2t
Hemerodromia	3t	8t	--	--	--	2.2t
Muscidae	--	--	--	2	--	0.4
Simulium	8	12	4	10	12	9.2
EPH: Caenis	--	16	100	--	60	35.2
Tricorythodes	1	--	--	--	--	0.2
HEM: Ambrysus mormon (A)	--	12	2	--	--	2.8
ANI: Leucorrhinia	--	--	--	--	4	0.8
ZYG: Coenagrionidae	--	--	--	--	4	0.8
Ischnura	--	12	2	--	--	2.8
TRI: Cheumatopsyche	400	3264	748	178	--	918.0
Hydropsyche	3	--	4	--	--	1.4
Hydroptila	7	--	--	8	12	5.4
AMP: Hyalella azteca	--	60	56	492	664	254.4
ACA: Acari	--	16	--	6	--	4.4
HIR: Erpobdellidae	1	--	--	6	--	1.4
Dina anoculata	--	--	--	--	4t	0.8t
Erpobdella	--	--	--	8	--	1.6
Batracobdella	--	--	--	4t	--	0.8t
Glossiphonia complanata	--	8	--	12	12	6.4
Helobdella stagnalis	--	--	4	128	280	82.4
Placobdella	1	--	2	--	--	0.6
Percymoorensis marmoratis	--	--	1t	2t	--	0.6t
OLI: Oligochaeta	--	--	--	10	--	2.0
GAS: Gyraulus	--	--	--	p	--	p
Physa	--	8	--	8	4	4.0
Totals	591	3844	1151	1132	1328	1609.2 (8046)

Table C52. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Hanging Woman Creek near Quietus-Decker during the 1978 sampling season.

Taxa/Collection Date	6/16	6/28	7/18	8/15	8/28	9/05	10/07	11/04
COL: Dubiraphia (L)	--	--	--	--	--	--	--	2
Dubiraphia (A)	--	--	--	--	--	--	1	--
Dubiraphia vittata (A)	--	--	--	--	--	--	--	--
Microcylloepus (L)	1	--	--	2	--	--	3	--
Microcylloepus (A)	--	--	--	--	--	--	17	18
Microcylloepus pusillus (A)	--	--	--	--	28	--	--	--
Stenelmis (L)	--	--	--	1	--	--	--	--
Hyperodes (L)	--	--	--	--	--	--	--	--
DIP: Bezzia-Probezzia	--	--	3	1	--	--	2	1
Palpomyia	--	--	--	--	--	2	--	--
Chironomidae	21	90	147	95	208	146	29	17
Empididae	--	--	--	--	--	--	2	--
Hemerodromia	--	--	--	--	14t	--	--	--
Limnophora	--	--	--	--	--	--	--	1t
Simulium (L)	436	2	--	7	290	31	520	1227
Simulium (P)	213	--	--	--	--	--	--	--
Tabanus	--	--	--	--	--	2	--	1
EPH: Baetis	--	--	--	--	--	1	--	--
Caenis	--	3	26	--	--	4	--	--
Ephemerellidae	--	--	--	--	--	--	--	--
Choroterpes-Leptophlebia	--	--	--	--	--	--	--	--
HEM: Sigara trillineata (A)	--	--	--	--	--	--	--	--
Ambrysus mormon (A)	--	--	--	--	2	--	--	--
MEG: Sialis	--	--	--	--	--	1	--	--
ODO: Odonata	--	1	--	--	--	--	--	--
ZYG: Hetaerina	--	--	--	--	--	--	--	--
Hetaerina americana	--	--	--	--	--	--	2	--
Coenagrionidae	--	--	--	--	--	--	--	--
Ischnura	--	--	--	--	--	--	1	--
TRI: Brachycentridae	--	--	1t	--	--	--	--	--
Cheumatopsyche	11	--	52	275	668	6	330	553
Hydropsyche	--	--	--	6	54	1	31	18
Hydroptila	--	--	--	--	--	--	1	--
Ithytrichia	--	10	--	14	8	--	--	--
Limnephilus	--	--	--	--	--	--	--	--
Polycentropus	--	1	5	--	--	--	--	--
AMP: Hyalella azteca	--	--	--	--	--	1	3	--
OLI: Oligochaeta	3	6	--	--	8	3	12	2
GAS: Gastropoda	--	--	--	--	--	--	--	--
Gyraulus	--	--	--	--	--	--	--	--
Physa	2	--	--	2	2	10	41	17
TUR: Turbellaria	1	--	--	--	--	--	--	--
NMT: Nematomorpha	--	1	--	--	--	--	--	--
Totals	688	114	234	403	1282	208	995	1857

Table C53. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Upper Hanging Woman Creek near Quietus-Decker during the 1979 sampling season.

Taxa/Collection Date	5/19	6/21	7/27	8/17	9/04	9/14	Two-Year Means
COL: Dubiraphia (L)	--	2	5	--	6	2	1.2
Dubiraphia (A)	--	--	4	--	2	--	0.5
Dubiraphia vittata (A)	--	--	--	--	--	1	0.1
Microcylloepus (L)	1	--	2	--	2	2	0.9
Microcylloepus (A)	5	--	1	--	--	--	2.9
Microcylloepus pusillus (A)	--	--	--	--	--	--	2.0
Stenelmis (L)	--	--	--	--	--	--	0.1
Hyperodes (L)	--	--	--	2t	--	--	0.1t
DIP: Bezzia-Probezzia	--	--	--	--	--	1	0.6
Palpomyia	--	--	--	--	--	--	0.1
Chironomidae	44	12	81	134	68	18	79.3
Empididae	2	--	--	--	--	--	0.3
Hemerodromia	--	--	--	--	--	--	1.0t
Limnophora	--	--	--	4t	--	--	0.4t
Simulium (L)	53	1	12	850	48	1t	248.4
Simulium (P)	--	--	--	--	--	--	15.2
Tabanus	--	--	--	--	--	--	0.2
EPH: Baetis	--	--	--	--	--	--	0.1
Caenis	--	3	3	--	--	--	2.8
Ephemerellidae	--	--	1t	--	--	--	0.1t
Choroterpes-Leptophlebia	--	--	--	--	2	--	0.1
HEM: Sigara trillineata (A)	--	--	2	--	--	--	0.1
Ambrysus mormon (A)	--	1	6	2	--	1	0.9
MEG: Sialis	--	--	--	--	--	--	0.1
ODO: Odonata	--	--	--	--	--	--	0.1
ZYG: Hetaerina	--	--	--	--	8	7	1.1
Hetaerina americana	--	--	1	--	--	--	0.2
Coenagrionidae	--	--	--	--	2	2	0.3
Ischnura	--	--	--	--	--	--	0.1
TRI: Brachycentridae	--	--	--	--	--	--	0.1t
Cheumatopsyche	318	58	25	482	128	42	210.6
Hydropsyche	31	6	4	44	14	2	15.1
Hydroptila	3	--	1	--	--	--	0.4
Ithytrichia	--	2	2	12	14	2	4.6
Limnephilus	1t	--	--	--	--	--	0.1t
Polycentropus	--	--	1	--	--	--	0.5
AMP: Hyalella azteca	--	--	2	8	6	3	1.6
OLI: Oligochaeta	--	1	--	2	--	2	2.8
GAS: Gastropoda	--	--	--	--	--	p	p
Gyraulus	--	p	--	--	6	p	0.4
Physa	--	4	6	46	164	48	24.4
TUR: Turbellaria	--	--	--	--	--	1	0.1
NMT: Nematomorpha	--	--	--	--	--	--	0.1
Totals	458	90	159	1586	470	135	620.1 (8679)

Table C54. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from lower Hanging Woman Creek near Birney during the 1978 sampling season (the first page of two pages).

Taxa/Collection Date	6/16	6/29	7/19	8/15	9/05	10/07	11/04
COL: Carabidae (L)	--	--	--	1	--	--	--
Curculionidae (L)	--	--	--	--	--	--	--
Agabus (L)	--	--	--	--	--	--	--
Elmidae (L)	1	--	--	--	--	--	--
Dubiraphia (L)	2	--	--	--	--	--	4
Dubiraphia (A)	--	--	--	--	--	--	--
Microcylloepus (L)	1	1	--	--	--	--	28
Microcylloepus (A)	--	--	--	--	--	--	64
Microcylloepus pusillus (A)	--	2	--	--	--	--	--
Stenelmis (L)	--	--	5	--	--	--	--
DIP: Ceratopogonidae	1	--	--	--	--	--	--
Bezzia-Probezzia	2	1	--	--	--	--	4
Palpomyia	1	--	--	--	--	--	--
Chironomidae	22	107	25	12	11	46	844
Dolichopodidae	--	--	--	--	--	--	--
Empididae	--	--	--	--	--	2	--
Hemerodromia	--	--	--	--	--	--	8t
Simulium (L)	1	544	116	119	121	765	2924
Simulium (P)	--	--	--	--	56	--	--
Dicranota	--	--	1	--	--	--	--
EPH: Baetis	--	--	--	--	--	--	--
Caenis	9	1	--	--	--	--	--
Heptageniidae	--	--	1	--	--	--	--
Choroterpes	--	--	--	--	--	--	--
HEM: Ambrysus mormon (A)	--	--	--	--	--	--	--
LEP: Parargyractis	--	--	--	--	--	--	--
MEG: Sialis	1	--	--	--	--	--	--

Table C54. Continued (the second page of two pages).

Taxa/Collection Date	6/16	6/29	7/19	8/15	9/05	10/07	11/04
ZYG:Zygoptera	--	--	--	--	--	--	--
Hetaerina	--	--	--	--	--	--	--
Ischnura	--	--	--	--	--	--	--
TRI:Cheumatopsyche	1	415	305	404	23	185	1640
Hydropsyche	--	4	57	58	18	69	372
Hydroptila	--	--	--	--	--	--	--
Ithytrichia	1	--	--	--	--	--	--
Polycentropus	--	--	--	--	--	--	--
AMP:Hyalella azteca	--	--	--	--	--	--	--
OST:Ostracoda	--	--	--	--	--	--	4
ACA:Acari	--	--	--	--	--	--	--
OLI:Oligochaeta	3	--	--	--	--	--	--
GAS:Gastropoda	--	--	--	--	--	--	--
Ferrissia	--	--	--	--	--	--	--
Lymnaea	1	--	--	--	--	--	--
Gyraulus	1	--	--	--	--	--	--
Physa	--	--	1	--	--	8	8
PEL:Pelecypoda	--	--	--	--	--	--	--
Pisidium	--	--	--	--	--	--	--
Sphaerium	1	--	--	--	P	--	--
Unionidae	1	--	--	--	--	--	--
NEM:Nematoda	--	--	--	--	--	--	36
NMT:Nematomorpha	--	--	--	--	--	--	--
Totals	50	1075	511	594	229	1075	5936

Table C55. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from lower Hanging Woman Creek near Birney during the 1979 sampling season (the first page of two pages).

Taxa/Collection Date	2/11	3/31	5/19	6/22	7/28	8/18	9/14a	9/14b	9/15c	Two-Year Means
COL:Carabidae (L)	--	--	--	--	--	--	--	--	--	0.1
Curculionidae (L)	--	--	1	--	--	--	--	--	--	0.1
Agabus (L)	--	--	1	--	--	--	--	--	--	0.1
Elmidae (L)	--	--	p	--	--	--	--	--	--	0.1
Dubiraphia (L)	--	1	--	--	2	--	--	--	26	2.2
Dubiraphia (A)	--	--	--	--	--	--	--	--	6	0.4
Microcylloepus (L)	6	1	--	--	20	2	--	6	16	5.1
Microcylloepus (A)	--	--	--	--	16	--	--	--	10	5.6
Microcylloepus pusillus (A)	--	12	--	--	--	--	--	--	--	0.9
Stenelmis (L)	2	--	--	--	2	--	--	3	--	0.8
DIP:Ceratopogonidae	--	--	--	--	--	--	--	--	--	0.1
Bezzia-Probezzia	--	--	1	--	2	--	12	1	2	1.6
Palpomyia	--	--	--	--	--	--	--	--	--	0.1
Chironomidae	400	306	405	131	262	190	168	171	70	198.1
Dolichopodidae	--	--	1t	--	--	--	--	--	--	0.1t
Empididae	--	--	--	--	24	--	--	--	--	1.6
Hemerodromia	14t	--	--	--	--	2t	16t	11t	2t	3.3t
Simulium (L)	672	163	837	265	138	590	2488	229	24	624.8
Simulium (P)	--	--	--	--	--	108	--	--	--	10.3
Dicranota	--	--	--	--	6	--	--	--	--	0.4
EPH:Baetis	--	2	--	--	--	2	--	--	12	1.0
Caenis	--	--	74	--	--	--	--	--	--	5.3
Heptageniidae	--	--	--	--	--	--	--	--	--	0.1
Choroterpes	--	4	--	--	--	--	--	--	--	0.3
HEM:Ambrysus mormon (A)	--	--	--	--	2	--	--	--	16	1.1
LEP:Parargyractis	--	1	--	--	--	--	--	1	6	0.5
MEG:Sialis	--	1	--	--	--	--	--	1	4	0.4

a--Collected at T07S,R43E,17C(upstream and intermediate sampling site).
b--Collected at T06S,R43E,19D(major downstream sampling site).
c--Collected at T06S,R43E,18B(sampling site near mouth).

Table C55. Continued (the second page of two pages).

Taxa/Collection Date	2/11	3/31	5/19	6/22	7/28	8/18	9/14a	9/14b	9/15c	Two-Year Means
ZYG:Zygoptera	--	--	--	--	2	--	--	--	--	0.1
Hetaerina	2	--	--	--	--	--	--	--	--	0.1
Ischnura	--	--	--	--	--	--	--	--	6	0.4
TRI:Cheumatopsyche	310	327	2	41	948	302	184	289	252	351.8
Hydropsyche	104	88	--	34	464	30	48	70	92	94.3
Hydroptila	2	--	--	1	4	16	--	2	--	1.6
Ithytrichia	--	--	--	5	2	4	--	--	--	0.8
Polycentropus	--	--	--	--	--	--	--	1	--	0.1
AMP:Hyalella azteca	--	--	--	1	--	--	--	--	--	0.1
OST:Ostracoda	--	--	--	--	--	--	--	--	--	0.3
ACA:Acari	--	--	--	--	4	--	--	--	--	0.3
OLI:Oligochaeta	--	--	--	2	--	--	--	1	--	0.4
GAS:Gastropoda	--	--	--	--	--	--	p	--	--	p
Ferrissia	--	--	--	--	--	--	--	--	2	0.1
Lymnaea	--	--	--	--	--	--	--	--	--	0.1
Gyraulus	--	--	--	--	--	--	--	--	--	0.1
Physa	--	5	2	2	--	--	4	2	58	5.6
PEL:Pelecypoda	--	p	--	--	--	--	--	--	--	p
Pisidium	--	--	--	--	--	--	--	--	2	0.1
Sphaerium	--	--	--	--	--	--	--	--	--	0.1
Unionidae	--	--	--	--	--	--	--	--	--	0.1
NEM:Nematoda	--	--	--	--	--	--	--	--	--	2.3
NMT:Nematomorpha	--	--	--	--	4	--	--	--	--	0.3
Totals	1512	911	1324	482	1902	1246	2920	788	606	1323.6 (21,161)

a--Collected at T07S,R43E,17C(upstream and intermediate sampling site).
b--Collected at T06S,R43E,19D(major downstream sampling site).
c--Collected at T06S,R43E,18B(sampling site near mouth).

Table C56. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from the East Fork of Hanging Woman near Birney (the first page of two pages).

Taxa/Collection Date	1978 Samples 6/11	8/18	10/8	11/04	1979 Samples 2/11	3/31	5/19	6/22	7/28	8/20	9/05	Means
COL: Curculionidae (L)	--	--	--	2	--	--	--	--	--	--	--	0.2
Helichus striatus (A)	--	--	1	--	--	--	1	--	--	--	--	0.2
Agabus (L)	1	--	--	--	--	--	--	--	--	--	--	0.1
Dubiraphia (L)	--	--	--	--	3	--	1	--	--	--	--	0.4
Dubiraphia (A)	--	--	--	--	--	--	2	--	--	--	--	0.2
Microcylloepus (L)	--	--	--	--	--	--	--	--	--	1	--	0.1
Optioservus (L)	--	--	6	--	--	--	--	--	--	--	--	0.5
Stenelmis (L)	1	--	--	--	--	--	--	--	--	--	--	0.1
DIP: Bezzia-Probezzia	--	1	--	4	8	--	1	1	--	--	--	1.4
Bezzia-Probezzia-Palpomyia	--	--	--	--	--	2	--	--	--	--	--	0.2
Chironomidae	33	1	19	36	5	57	21	--	8	1	2	16.6
Dixa	--	1	--	--	--	--	--	--	--	--	--	0.1
Dolichopodidae	--	--	--	--	--	--	--	--	1	--	--	0.1
Clinocera-Chelifera	--	--	--	1t	1t	--	1t	--	--	--	--	0.3t
Hemerodromia	--	--	--	--	--	--	1t	--	--	--	--	0.1t
Muscidae	--	--	--	1	--	--	--	--	1	--	--	0.2
Pericoma	--	--	--	6	15	--	--	--	--	--	--	1.9
Simulium (L)	133	20	32	17	5	3	2	--	150	130	214	64.2
Simulium (P)	--	--	--	--	--	9	--	p	--	--	14	2.1
Stratiomyidae	--	--	--	--	--	1	--	--	--	--	--	0.1
Euparyphus	7	--	--	--	--	--	1	--	1	--	--	0.8
Tabanus	--	--	--	--	--	--	--	--	1	--	--	0.1
Dicranota	--	2	1	--	1	--	3	--	14	3	--	2.2
Tipula	4	1	9	23	10	12	3	--	--	--	--	5.6
EPH: Baetidae	--	--	--	3	--	--	--	--	--	--	--	0.3
Baetis	179	5	29	--	13	12	69	--	18	10	39	34.0
MEG: Sialis	--	--	--	2	--	--	--	--	--	--	--	0.2

Table C56. Continued (the second page of two pages).

Taxa/Collection Date	1978 Samples 6/11	8/18	10/8	11/04	1979 Samples 2/11	3/31	5/19	6/22	7/28	8/20	0/95	Means
ODO:Odonata	--	--	1	--	--	--	--	--	--	--	--	0.1
ZYG:Argia	--	--	1	--	--	--	--	--	--	--	--	0.1
Argia vivida	--	1	--	--	--	--	--	--	--	--	--	0.1
Ischnura	1	--	--	--	--	--	--	--	--	--	--	0.1
TRI:Helicopsyche	--	--	--	--	--	p	--	--	--	--	--	p
Cheumatopsyche	22	--	7	156	83	9	52	1	--	5	1	30.5
Hydropsyche	--	--	1	5	8	1	110	--	--	1	--	11.5
Hydroptila (L)	--	--	--	1	--	--	--	--	--	--	--	0.1
Hydroptila (P)	--	--	--	--	--	--	--	p	--	--	--	p
Ochrotricha	--	--	--	--	--	--	--	--	--	--	1	0.1
Hesperophylax (L)	1	6	49	9	2	5	--	--	14	46	11	13.0
Hesperophylax (P)	--	1	--	--	--	--	--	p	--	--	--	0.1
Polycentropus	--	--	--	1	--	--	--	--	--	--	--	0.1
AMP:Hyalella azteca	2	--	--	4	--	--	--	--	--	--	--	0.5
ACA:Acari	--	--	7	2	--	--	1	--	2	--	2	1.3
HIR:Hirudinea	--	--	1	--	1	--	--	--	--	--	--	0.2
Glossiphonia complanata	--	1	--	--	--	--	--	--	--	--	--	0.1
OLI:Oligochaeta	--	1	3	3	3	44	2	--	1	--	4	5.5
GAS:Lymnaea	3	--	--	3	--	--	--	--	--	--	--	0.5
Physa	1	1	p	7	p	1	1	1	--	--	--	1.1
Columnella	--	--	--	--	--	--	p	--	--	--	--	p
PEL:Pisidium	1	1	1	5	7	--	--	--	--	--	--	1.4
Sphaerium	--	--	--	--	--	--	--	p	--	--	--	p
NMT:Nematomorpha	--	--	--	--	--	--	--	--	1	--	--	0.1
Totals	389	43	168	291	165	156	272	3	212	197	288	198.8 (2184)

Table C57. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Bear Creek near Otter.

Taxa/Collection Date	7/12/79	8/23/79	9/30/79	Means
COL: Agabus (L)	14	--	2	5.3
Rhantus (L)	--	1t	--	0.3t
Haliplus (A)	--	1	--	0.3
Hydrophilidae (L)	2	--	--	0.7
Enochrus (L)	6t	--	--	2.0t
Helophorus (A)	2	--	--	0.7
Laccobius (L)	--	1t	--	0.3t
Laccobius (A)	2t	--	--	0.7t
DIP: Bezzia-Probezzia	--	--	2	0.7
Chironomidae	422	31	464	305.7
Hererodromia	--	--	2t	0.7t
Muscidae	46	--	16	20.7
Limnophora	--	24t	--	8.0t
Simulium (L)	82	52	476	203.3
Simulium (P)	--	--	42	14.0
Euparyphus	--	1	--	0.3
Stratiomys	--	1	--	0.3
Tabanus	--	2	--	0.7
ZYG: Coenagrionidae	--	--	2	0.7
TRI: Cheumatopsyche	12	1	20	11.0
Hydroptila	82	--	4	28.7
Ithytrichia	--	--	2	0.7
AMP: Hyallela azteca	4	3	10	5.7
OST: Ostracoda	2	--	--	0.7
OLI: Oligochaeta	6	--	6	4.0
GAS: Lymnaea	70	p	--	23.3
Gyraulus	14	--	--	4.7
Physa	32	3	42	25.7
Totals	798	121	1090	669.9 (2009)

Table C58. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Otter Creek near Otter-Fort Howe.

Taxa/Collection Date	1978 Samples 7/07	1978 Samples 8/29	1979 Samples 6/27	1979 Samples 7/31	1979 Samples 8/31	1979 Samples 9/30a	1979 Samples 9/30b	Means
COL: Listronotus (A)	--	--	4t	--	--	--	--	0.6t
Agabus (L)	--	--	8	--	--	--	--	1.1
Deronectes (A)	--	--	--	--	4	--	--	0.6
Dubiraphia (L)	10	--	--	--	16	--	8	4.9
Dubiraphia (A)	--	--	12	2	8	--	--	3.1
Microcylloepus (L)	2	--	--	--	--	--	8	1.4
Microcylloepus (A)	--	--	--	--	--	--	4	0.6
Haliplus (L)	--	--	--	2	--	--	--	0.3
DIP: Bezzia	5t	--	--	--	--	--	--	0.7t
Bezzia-Probezzia	8	--	12	--	8	1	12	5.9
Palpomyia	--	--	--	--	--	2	--	0.3
Chironomidae	611	672	2376	148	1304	29	696	833.7
Hemerodromia	--	--	--	--	--	--	4t	0.6t
Muscidae	--	24	--	--	12	--	4	5.7
Limnophora	--	--	36t	--	--	--	--	5.1t
Simulium (L)	10	748	276	166	8812	1	1056	1581.3
Simulium (P)	--	504	--	--	--	--	--	72.0
Chrysops	--	1	--	--	4	--	--	0.7
Dicranota	--	--	12	--	--	--	--	1.7
EPH: Baetis	--	--	4t	--	--	--	--	0.6t
Caenis	17	4	--	2	4	--	28	7.9
HEM: Ambrysus mormon (A)	11	--	--	--	--	--	--	1.6
MEG: Sialis	6	--	--	--	--	--	--	0.9
ZYG: Argia	--	--	--	--	--	9	4	1.9
Ischnura	--	--	--	2	20	--	20	6.0
TRI: Cheumatopsyche	1	120	36	40	244	17	548	143.7
Hydropsyche	--	--	--	2	--	--	--	0.3
Hydroptila	19	268	44	8	24	--	8	53.0
Ithytrichia	8	--	--	--	--	--	--	1.1
Neureclipsis	1t	--	--	--	--	--	--	0.1t
Polycentropus	1	--	--	--	--	--	--	0.1
AMP: Hyalella azteca	12	28	--	50	692	16	332	161.4
ACA: Acari	--	4	--	2	4	--	--	1.4
HIR: Hirudinea	1	--	--	--	--	--	--	0.1
Glossiphoniidae	--	--	--	10	--	--	--	1.4
Glossiphonia complanata	--	--	--	--	--	--	2	0.3
Helobdella stagnalis	--	--	--	--	8	--	--	1.1
OLI: Oligochaeta	--	--	--	10	16	2	--	4.0
GAS: Gyraulus	--	--	p	20	4	--	4	4.0
Helisoma	3	--	--	--	--	--	--	0.4
Physa	--	--	--	6	20	16	68	15.7
PEL: Pisidium	1	--	4	--	--	--	4	1.3
Totals	727	2373	2824	470	11,204	93	2810	2928.6 (20,501)

a--Collected at T08S,R46E,05C(upstream sampling site above Bear Creek).
b--Collected at T07S,R45E,13D(major upstream sampling site).

Table C59. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Cow Creek near Otter-Fort Howe.

Taxa/Collection Date	7/31/79	8/31/79	Means
COL: Helichus striatus (A)	--	1	0.5
Optioservus (L)	162	60	110.0
Optioservus (A)	54	2	28.0
Optioservus divergens (A)	--	12	6.0
Optioservus quadrimaculatus (A)	--	11	5.5
Agabus (L)	2	--	1.0
Agabus (A)	6	--	3.0
DIP: Chironomidae	18	6	12.0
Simulium (L)	18	8	13.0
Simulium (P)	--	27	13.5
Nemotelus	--	1	0.5
Dicranota	6	--	3.0
EPH: Baetis	50	59	54.5
HEM: Gerris remigis (A)	1	--	0.5
ZYG: Argia	--	1	0.5
PLE: Nemouridae	--	6	3.0
Nemoura	10	7	8.5
TRI: Cheumatopsyche	--	2	1.0
Hesperophylax	52	27	39.5
Psychoglypha	2	--	1.0
AMP: Hyalella azteca	2	2	2.0
ACA: Acari	--	2	1.0
OLI: Oligochaeta	--	1	0.5
PEL: Pisidium	--	2	1.0
NMI: Nematomorpha	--	1	0.5
Totals	383	238	310.5 (621)

Table C60. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from lower Otter Creek near Ashland (the first page of two pages).

	1978 Samples							1979 Samples								
Taxa/Collection Date	6/15	7/05	7/21	7/31	9/04	10/08	11/05	2/11	3/31	5/20	6/20	7/28	8/18	9/30a	9/30b	Means
COL:Donacia (L)	--	--	--	--	--	--	--	2	--	--	--	--	--	--	--	0.1
Dubiraphia (L)	--	--	--	--	--	--	--	--	1	1	--	--	--	--	--	0.1
Dubiraphia (A)	--	--	--	--	--	--	--	--	1	--	--	--	--	--	--	0.1
Microcylloepus (L)	--	--	--	--	--	7	4	34	2	--	8	6	76	164	28	21.9
Microcylloepus (A)	--	--	4	1	--	--	4	2	--	--	1	3	28	6	4	3.5
Microcylloepus pusillus (A)	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
Stenelmis (L)	--	--	--	7	24	1	--	--	2	--	--	--	44	--	4	5.5
Stenelmis (A)	--	--	--	--	12	--	--	--	--	--	1	--	--	--	--	0.9
Stenelmis sinuata-humerosa (A)	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	0.1
Hydraenidae (L)	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	0.1
Laccobius (L)	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	0.1
DIP:Bezzia-Probezzia	--	--	12	--	--	--	--	--	10	5	--	--	--	28	--	3.7
Chironomidae	2	111	480	286	832	200	122	616	18	97	706	320	2044	458	448	449.3
Clinocera-Chelifera	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4t	0.3t
Hemerodromia	--	--	--	--	4t	2t	--	--	--	--	--	3t	16t	2t	12t	2.6t
Simulium (L)	--	17	888	27	816	6	310	--	1	11	41	69	192	16	2320	314.3
Simulium (P)	--	--	--	--	--	--	--	--	--	--	--	--	96	--	--	6.4
Euparyphus	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--	0.1
Nemotelus	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	0.1
Chrysops	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--	0.1
EPH:Baetis	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	0.1
Caenis	1	1	12	1	8	1	--	6	2	--	--	--	4	10	--	3.1
Tricorythodes	--	--	--	--	--	2	--	--	--	--	--	--	--	--	16	1.2
HEM:Corixidae (L)	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1
Ambrysus mormon (A)	--	1	8	--	--	--	--	2	2	--	--	--	4	2	--	1.3
LEP:Parargyractis	--	--	--	--	--	1	--	--	--	--	--	--	4	--	--	0.3

a--Collected at T05S,R45E,11C(upstream and intermediate sampling site).
b--Collected at T03S,R44E,12C(major downstream sampling site).

Table C60. Continued (the second page of two pages).

Taxa/Collection Date	1978 Samples 6/15	7/05	7/21	7/31	9/04	10/08	11/05	1979 Samples 2/11	3/31	5/20	6/20	7/28	8/18	9/30a	9/30b	Means
ZYG: Hetaerina	--	--	--	--	--	--	--	--	--	--	--	--	--	--	16	1.2
Hetaerina americana	--	--	--	--	--	3	--	--	--	--	--	--	--	--	--	0.2
Ischnura	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	0.1
TRI: Brachycentrus	--	--	--	--	16	--	--	--	--	--	--	--	--	--	--	1.1
Cheumatopsyche	--	14	544	311	208	145	230	130	22	23	296	97	1500	286	888	312.9
Hydropsyche	--	3	--	13	32	14	50	10	--	2	8	4	128	--	56	21.3
Hydroptila	--	1	56	82	16	186	14	10	7	--	79	14	56	50	40	40.7
Ithytrichia	--	--	4	6	12	--	--	--	--	--	37	3	12	4	--	5.2
Ochrotrichia	--	--	--	--	--	--	--	--	--	--	--	--	12	--	--	0.8
Limnephilidae	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--	0.1
AMP: Hyalella azteca	--	--	--	--	--	--	--	--	14	--	--	--	--	--	--	0.9
ACA: Acari	--	--	--	--	--	--	--	--	1	--	--	--	4	--	--	0.3
HIR: Hirudinea	--	--	--	--	--	--	--	2	1	--	1	--	--	--	--	0.3
Glossiphonia complanata	--	--	--	--	--	--	--	--	--	--	--	--	--	6	--	0.4
Hebobdella stagnalis	--	--	--	--	--	--	--	--	--	--	--	--	--	12	--	0.8
OLI: Oligochaeta	--	1	--	--	--	2	4	2	8	3	2	--	--	--	--	1.5
GAS: Gyraulus	--	--	--	--	--	--	--	--	p	--	--	p	--	40	--	2.7
Helisoma	--	--	--	--	--	--	--	--	--	--	--	--	--	4	--	0.3
Physidae	--	--	--	--	--	--	--	--	--	--	--	--	4	--	--	0.3
Physa	--	--	--	--	--	p	--	4	12	--	--	1	--	18	--	2.3
PEL: Pelecypoda	--	p	--	--	--	--	--	--	--	--	--	--	--	--	--	p
NEM: Nematoda	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	0.1
NMT: Nematomorpha	--	--	--	--	--	--	--	--	2	--	--	--	--	--	--	0.1
Totals	4	151	2008	736	1980	570	740	820	112	142	1180	522	4224	1112	3836	1209.1 (18,137)

a--Collected at T05S,R45E,11C(upstream and intermediate sampling site).
b--Collected at T03S,R44E,12C(major downstream sampling site).

Table C61. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Pumpkin Creek near Miles City.

Taxa/Collection Date	6/15/78	7/05/78	7/21/78	7/31/78	9/06/78	10/09/78	5/12/79	8/09/79	Means
COL: Dubiraphia (A)	--	1	--	--	--	--	--	--	0.1
Microcylloepus (A)	--	--	--	--	16	--	--	--	2.0
Stenelmis vittipennis (A)	--	--	--	1	--	--	--	--	0.1
Ochthebius (A)	--	--	--	--	--	--	--	1t	0.1t
Laccobius (L)	--	2	--	--	--	--	--	--	0.3
DIP: Bezzia-Probezzia	--	--	3	3	--	--	--	3	1.1
Chironomidae	1	6	14	41	692	164	4	102	128.0
Hemerodromia	--	--	--	1t	20t	4t	--	1t	3.3t
Simulium	--	5	2	2	68	20	2	2	12.6
EPH: Baetis	--	--	--	--	24	2t	--	--	3.3
Caenis	--	11	6	7	--	--	54	5	10.4
HEM: Corixidae (L)	1	--	--	--	--	--	--	--	0.1
Sigara (A)	--	--	--	--	--	--	--	2	0.3
TRI: Cheumatopsyche	--	2	3	23	4076	1054	3	12	646.6
Hydropsyche	--	4	2	5	704	119	1	--	104.4
Hydroptila	--	--	--	1	--	--	--	2	0.4
Ithytrichia	--	--	--	8	4	--	--	10	2.8
AMP: Hyalella azteca	--	1	--	--	--	--	5	1	0.9
OLI: Oligochaeta	2	--	--	1	--	3	--	--	0.8
GAS: Lymnaea	--	1t	--	--	--	--	--	--	0.1t
Physa	--	--	--	--	--	1	--	1	0.3
NEM: Nematoda	--	1	--	--	--	--	--	--	0.1
NMT: Nematomorpha	--	--	--	--	--	--	--	3	0.4
Totals	4	34	30	93	5604	1367	69	145	918.5 (7346)

Table C62. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Mizpah Creek near Mizpah.

Taxa/Collection Date	6/15/78	7/05/78	7/21/78	7/31/78	9/06/78	10/09/78	5/12/79	8/09/79	Means
COL:Dytiscidae (L)	--	--	--	--	--	2	--	--	0.3
Stenelmis (L)	--	--	--	--	--	2	--	--	0.3
DIP:Bezzia-Probezzia	--	--	--	--	--	1	--	--	0.1
Bezzia-Probezzia-Palpomyia	--	--	9	--	--	--	--	--	1.1
Chironomidae	7	1	3	1	104	39	2	126	35.4
Hemerodromia	--	--	--	--	4t	--	--	--	0.5t
Muscidae	--	--	--	1	--	--	--	--	0.1
Simulium (L)	50	--	3	--	8	--	3	--	8.0
Simulium (P)	--	1	--	--	--	--	--	--	0.1
EPH:Baetidae	--	--	--	--	64	--	--	--	8.0
Baetis	1	--	--	--	--	--	--	--	0.1
Caenis	--	1	6	1	--	654	--	--	82.8
Heptageniidae	--	1	--	--	--	--	--	--	0.1
Heptagenia	--	--	--	1t	--	--	--	--	0.1t
Leptophlebiidae	--	--	--	--	--	2	--	--	0.3
Choroterpes	--	--	--	--	--	--	--	10t	1.3t
HEM:Heteroptera (L)	--	1	--	--	--	--	--	--	0.1
Sigara (A)	--	--	--	--	--	--	--	1	0.1
Ambrysus mormon (A)	--	--	--	--	--	--	--	1	0.1
ZYG:Ischnura	--	--	--	--	--	6	--	--	0.8
TRI:Cheumatopsyche	1	1	2	--	1584	8	1	126	215.4
Hydropsyche	--	--	--	--	68	--	--	--	8.5
Ithytrichia (P)	--	p	--	--	--	--	--	14	1.8
Polycentropus	--	--	--	--	--	--	--	2	0.3
AMP:Hyalella azteca	--	1	3	--	--	37	--	--	5.1
OLI:Oligochaeta	1	--	1	--	--	--	--	--	0.3
GAS:Physa	--	--	--	--	--	1	--	2	0.4
Totals	60	7	27	4	1832	752	6	282	371.5 (2970)

Table C63. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from the West Fork of Armells Creek near Colstrip and from lower Armells Creek near Forsyth.

	West Fork Armells			Lower Armells Creek			
	1978	1979		1979 Samples			
Taxa/Collection Date	5/28	7/03	Means	7/03	8/22	11/07	Means
COL: Agabus (L)	1	--	0.5	--	--	--	--
Berosus (L)	--	1	0.5	--	--	--	--
DIP: Bezzia-Probezzia-Palpomyia	--	--	--	--	--	3	1.0
Chironomidae	1	134	67.5	1	28	115	48.0
Scatophagidae	--	3t	1.5t	--	--	--	--
Simulium	55	4	29.5	--	--	3	1.0
Tabanus	--	--	--	--	1	--	0.3
Tipulidae	1t	--	0.5t	--	--	--	--
EPH: Caenis	--	2	1.0	--	--	113	37.7
Choroterpes	--	--	--	--	51	--	17.0
HEM: Ambrysus mormon (A)	--	--	--	p	9	2	3.7
ANI: Libellulidae	--	2	1.0	--	--	--	--
ZYG: Argia	--	--	--	--	--	1	0.3
Ischnura	--	3	1.5	--	--	2	0.7
TRI: Cheumatopsyche	--	--	--	--	89	3	30.7
Ithytrichia	--	--	--	--	9	--	3.0
Polycentropus	--	--	--	--	--	1	0.3
AMP: Hyalella azteca	--	1	0.5	--	--	--	--
OLI: Oligochaeta	--	--	--	--	--	1	0.3
GAS: Lymnaea	--	12	6.0	--	--	--	--
Physa	--	--	--	p	113	3	38.7
Totals	58	162	110.0 (220)	1	300	247	182.7 (548)

Table C64. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Sweeney Creek near Rosebud.

Taxa/Collection Date	5/28/78	7/12/78	5/13/79	8/21/79	Means
COL:Dubiraphia (L)	--	--	8	2	2.5
Microcylloepus (L)	--	--	1	--	0.3
Microcylloepus (A)	--	--	--	1	0.3
Berosus (L)	--	--	6	1	1.8
DIP:Ceratopogonidae	--	1	--	--	0.3
Bezzia-Probezzia	--	--	9	--	2.3
Chironomidae	1	51	88	124	66.0
Simulium	17	--	5	2	6.0
Tipula	--	--	--	1	0.3
EPH:Caenis	10	9	25	--	11.0
Leptophlebiidae	--	--	1	--	0.3
Choroterpes	--	--	--	15	3.8
HEM:Ambrysus mormon (A)	--	--	--	8	2.0
TRI:Cheumatopsyche	--	12	8	91	27.8
Hydropsyche	--	--	--	13	3.3
Ithythrichia	--	--	--	13	3.3
OLI:Oligochaeta	--	1	1	--	0.5
GAS:Physa	--	p	--	38	9.5
Totals	28	74	152	309	141.3 (563)

Table C65. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Reservation Creek near Forsyth-Hysham.

Taxa/Collection Date	5/28/78	7/12/78	8/22/78	5/13/79	8/22/79	Means
COL:Agabus (L)	1	--	2	--	--	0.6
Liodessus (A)	--	3	2	--	--	1.0
Oreodytes (L)	--	12	--	--	--	2.4
Dubiraphia (L)	--	2	--	--	8	2.0
DIP:Ceratopogonidae	--	--	1	--	--	0.2
Bezzia-Probezzia-Palpomyia	--	--	--	44	--	8.8
Palpomyia	--	1	--	2	--	0.6
Chironomidae	84	202	82	376	344	217.6
Hemerodromia	--	--	--	--	4t	0.8t
Simulium	35	--	28	6	12	16.2
Tabanidae	--	--	1	--	--	0.2
Chrysops	--	4t	--	--	8t	2.4t
Tabanas	--	--	--	--	4	0.8
EPH:Baetis	1	--	--	--	--	0.2
Caenis	--	1	--	2	4	1.4
Tricorythodes	1	--	--	--	--	0.2
HEM:Hesperocorixa (A)	--	1	--	--	--	0.2
MEG:Sialis	--	3	1	--	--	0.8
ANI:Aeshna	--	--	1	--	--	0.2
Libellulidae	--	1	--	--	--	0.2
ZYG:Coenagrionidae	1	--	--	--	--	0.2
Argia	--	--	--	--	8	1.6
Ischnura	--	--	2	--	148	30.0
TRI:Cheumatopsyche	--	--	38	16	2180	446.8
Hydroptila	--	--	12	8	20	8.0
Limnephilus	1	--	--	--	--	0.2
Ptilostomis	--	--	3	--	--	0.6
AMP:Hyalella azteca	1	88	299	22	668	215.6
OST:Ostracoda	--	3	--	--	--	0.6
ACA:Acari	--	1	--	4	28	6.6
HIR:Hirudinea	--	1	3	--	--	0.8
OLI:Oligochaeta	--	6	2	6	8	4.4
GAS:Gyraulus	--	3	--	--	p	0.6
Physa	--	22	2	--	1024	209.6
PEL:Pisidium	--	--	3	30	p	6.6
Totals	125	354	482	516	4468	1189.0 (5945)

Table C66. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from Sarpy Creek near Hysham.

Taxa/Collection Date	7/12/78	8/22/78	5/13/79	8/22/79	Means
COL:Dubiraphia (L)	--	1	--	88	22.3
Dubiraphia (A)	--	--	--	8	2.0
Microcylloepus (A)	--	1	--	--	0.3
DIP:Bezzia-Probezzia	2	--	--	2	1.0
Chironomidae	113	361	16	380	217.5
Hemerodromia	--	3t	--	--	0.8t
Simulium (L)	41	29	--	2	18.0
Simulium (P)	17	--	--	--	4.3
EPH:Baetis	--	1	--	--	0.3
Caenis	1	--	--	14	3.8
Leptophlebiidae	--	1	--	--	0.3
Choroterpes	--	1	--	2	0.8
ANI:Gomphus	--	--	--	2	0.5
ZYG:Ischnura	--	--	--	2	0.5
TRI:Cheumatopsyche	39	35	--	12	21.5
Hydropsyche	3	1	1	--	1.3
Hydroptila	25	16	--	--	10.3
AMP:Hyalella azteca	--	3	--	2	1.3
ACA:Acari	1	--	--	--	0.3
OLI:Oligochaeta	2	1	--	4	1.8
GAS:Physa	--	--	--	22	5.5
NMT:Nematomorpha	--	2	--	--	0.5
Totals	244	456	17	540	314.9 (1257)

Table C67. Density (numbers per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Powder River near Moorhead and near Mizpah.

Taxa/Collection Date	Powder River-Moorhead 9/14/79	Powder River-Mizpah 8/09/79	Means
COL:Microcylloepus (L)	4	--	2.0
DIP:Chironomidae	8	2	5.0
Hemerodromia	1t	--	0.5t
Simulium	292	2	147.0
EPH:Baetis	4	--	2.0
Choroterpes-Leptophlebia	8	--	4.0
PLE:Acroneuria	4	--	2.0
Isoperla	1	--	0.5
TRI:Cheumatopsyche	276	268	272.0
Hydropsyche	60	4	32.0
Totals	658	276	467.0 (934)

Table D68. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the upper Rosebud Creek near Kirby station.

Taxa/Collection Date	9/05/78a	10/08/78a	9/15/79a	11/06/79a	Means
COL:Dubiraphia (L)	1	--	--	--	0.3
Microcylloepus (L)	1	--	2	--	0.8
Microcylloepus (A)	--	1	4	--	1.3
Optioservus (L)	--	--	2	8	2.5
Stenelmis (L)	--	--	--	--	0.0
Stenelmis (A)	--	--	--	--	0.0
DIP:Chironomidae	36	41	50	156	70.8
Empididae	--	--	--	--	0.0
Clinocera	--	--	--	--	0.0
Hemerodromia	--	--	14t	4t	4.5t
Simulium	10	1	--	32	10.8
Dicranota	--	--	--	12	3.0
EPH:Baetis	26	31	8	112	44.3
Heptageniidae	--	--	--	--	0.0
Heptagenia	--	--	10	12	5.5
Stenonema	--	--	4	--	1.0
Leptophlebiidae	--	--	--	--	0.0
Choroterpes	2	--	--	--	0.5
Leptophlebia	--	--	--	24	6.0
Paraleptophlebia	--	--	16	--	4.0
Tricorythodes	1	22	46	28	24.3
HEM:Ambrysus mormon (A)	--	--	--	--	0.0
MEG:Sialis	--	--	--	--	0.0
ANI:Aeshna	--	--	--	--	0.0
Ophiogomphus	--	--	2	--	0.5
ZYG:Zygoptera	--	--	--	--	0.0
Argia	--	--	--	--	0.0
Ischnura	--	--	--	--	0.0
PLE:Isoperla	--	4	--	44	12.0
TRI:Brachycentrus	23	23	8	4	14.5
Hydropsychidae	--	--	--	--	0.0
Cheumatopsyche	2	26	144	144	79.0
Hydropsyche	129	220	364	256	242.3
Hydroptila	2	--	12	232	61.5
Oecetis	--	--	--	--	0.0
Nectopsyche	--	--	--	--	0.0
Anabolia	--	--	--	--	0.0
Neureclipsis	--	--	--	--	0.0
Polycentropus	--	--	--	--	0.0
Ptilostomis	--	--	--	--	0.0
OLI:Oligochaeta	--	--	--	--	0.0
GAS:Ferrissia	--	2	--	4	1.5
Gyraulus	--	2	--	--	0.5
Helisoma	--	--	--	--	0.0
Physa	1	--	2	4	1.8
PEL:Pisidium	--	--	--	--	0.0
Sphaerium	--	--	--	--	0.0
Totals	234	373	688	1076	593.2 (2371)

Sampling Location: a--T06S,R39E,20C.

Table D69. Numbers of benthic macroinvertebrares collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the upper Rosebud Creek near Kirby station.

Taxa/Collection Date	9/05/78a	10/08/78a	9/15/79a	11/06/79a	Means
COL: Dubiraphia (L)	--	--	4	8	3.0
Microcylloepus (L)	--	--	--	1	0.3
Microcylloepus (A)	--	--	--	--	0.0
Optioservus (L)	--	--	4	--	1.0
Stenelmis (L)	--	--	--	1	0.3
Stenelmis (A)	--	--	2	--	0.5
DIP: Chironomidae	25	19	148	296	122.0
Empididae	--	--	--	--	0.0
Clinocera	--	--	--	4t	1.0t
Hemerodromia	--	--	--	--	0.0
Simulium	1	--	--	--	0.3
Dicranota	--	--	--	--	0.0
EPH: Baetis	2	1t	2	8	3.3
Heptageniidae	--	--	--	--	0.0
Heptagenia	--	--	4t	12	4.0
Stenonema	--	1t	--	--	0.3t
Leptophlebiidae	--	--	--	--	0.0
Choroterpes	4	--	18	--	5.5
Leptophlebia	--	1t	--	64	16.3
Paraleptophlebia	--	--	--	--	0.0
Tricorythodes	1	9	82	52	36.0
HEM: Ambrysus mormon (A)	--	--	--	--	0.0
MEG: Sialis	--	--	--	--	0.0
ANI: Aeshna	--	--	--	--	0.0
Ophiogomphus	--	--	--	8	2.0
ZYG: Zygoptera	--	--	--	--	0.0
Argia	--	1	--	--	0.3
Ischnura	--	--	--	4	1.0
PLE: Isoperla	--	1	--	3t	1.0t
TRI: Brachycentrus	131	100	38	32	75.3
Hydropsychidae	11	--	--	--	2.8
Cheumatopsyche	--	--	6	8	3.5
Hydropsyche	34	19	46	116	53.8
Hydroptila	--	--	18	208	56.5
Oecetis	--	--	--	4	1.0
Nectopsyche	--	--	--	8	2.0
Anabolia	--	--	--	8	2.0
Neureclipsis	--	--	--	--	0.0
Polycentropus	--	--	4	--	1.0
Ptilostomis	--	--	--	2	0.5
OLI: Oligochaeta	2	--	--	8	2.5
GAS: Ferrisia	--	--	10	8	4.5
Gyraulus	--	--	--	--	0.0
Helisoma	--	--	--	p	p
Physa	--	--	8	12	5.0
PEL: Pisidium	--	--	--	--	0.0
Sphaerium	--	--	--	4	1.0
Totals	211	152	394	879	409.5 (1636)

Sampling Location: a--T06S,R39E,20C.

Table D70. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the upper Rosebud Creek near Kirby station.

Taxa/Collection Date	9/05/78a	10/08/78a	9/15/79a	11/06/79a	Means
COL:Dubiraphia (L)	3	2	3	1	2.3
Microcylloepus (L)	2	--	--	--	0.5
Microcylloepus (A)	--	--	--	--	0.0
Optioservus (L)	--	--	--	--	0.0
Stenelmis (L)	--	--	--	--	0.0
Stenelmis (A)	--	--	--	--	0.0
DIP:Chironomidae	108	62	14	33	54.3
Empididae	--	8	--	--	2.0
Clinocera	2t	--	--	--	0.5t
Hemerodromia	3t	--	--	--	0.8t
Simulium	4	--	--	--	1.0
Dicranota	--	--	--	1	0.3
EPH:Baetis	--	--	--	1	0.3
Heptageniidae	3	--	--	1	1.0
Heptagenia	2	--	7	--	2.3
Stenonema	--	--	--	--	0.0
Leptophlebiidae	3	--	--	--	0.8
Choroterpes	--	4t	1	--	1.3t
Leptophlebia	--	--	5	7	3.0
Paraleptophlebia	--	6t	3	--	2.3
Tricorythodes	19	46	15	1	20.3
HEM:Ambrysus mormon (A)	1	--	--	--	0.3
MEG:Sialis	--	--	1	1	0.5
ANI:Aeshna	1	--	--	--	0.3
Ophiogomphus	--	--	--	--	0.0
ZYG:Zygoptera	1	--	--	--	0.3
Argia	--	--	--	--	0.0
Ischnura	--	--	3	--	0.8
PLE:Isoperla	--	1	--	1	0.5
TRI:Brachycentrus	29	145	13	9	49.0
Hydropsychidae	--	--	--	--	0.0
Cheumatopsyche	1	--	12	2	3.8
Hydropsyche	4	30	--	--	8.5
Hydroptila	--	3	--	2	1.3
Oecetis	--	--	1	1	0.5
Nectopsyche	--	1	--	--	0.3
Anabolia	--	1	--	--	0.3
Neureclipsis	1t	--	--	--	0.3t
Polycentropus	--	--	3	6	2.3
Ptilostomis	--	--	--	--	0.0
OLI:Oligochaeta	1	--	1	2	1.0
GAS:Ferrisia	11	5	4	2	5.5
Gyraulus	1	--	--	--	0.3
Helisoma	--	--	--	--	0.0
Physa	1	1	6	5	3.3
PEL:Pisidium	p	--	--	--	p
Sphaerium	--	--	--	--	0.0
Totals	201	315	92	76	172.1 (684)

Sampling Location: a--T06S,R39E,20C.

Table D71. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Tongue River near Pyramid Butte-Birney station (the first page of two pages).

	Riffle Habitat(1)			Riffle to Pool Habitat(2)				Pool Habitat(3)			
	1978	1979		1978	1979			1978	1979		
Taxa/Collection Date	10/08a	9/15a	Means	9/05a	9/15a	11/05a	Means	10/08a	9/15a	11/05a	Means
COL: Helichus striatus (A)	--	--	0.0	--	--	2	0.7	--	--	--	0.0
Dubiraphia (L)	1	28	14.5	--	1	--	0.3	--	20	8	9.3
Dubiraphia (A)	2	4	3.0	--	1	22	7.7	--	--	4	1.3
Microcylloepus (L)	115	60	87.5	--	3	8	3.7	--	24	76	33.3
Microcylloepus (A)	19	44	31.5	--	5	6	3.7	--	2	4	2.0
Stenelmis (L)	10	8	9.0	102	2	--	34.7	--	2	--	0.7
Stenelmis (A)	1	16	8.5	--	14	36	16.7	--	24	56	26.7
DIP: Chironomidae	30	8	19.0	18	5	40	21.0	4	10	88	34.0
Simulium	1	8	4.5	--	1	--	0.3	--	--	--	0.0
EPH: Ephemeroptera	--	--	0.0	2	--	--	0.7	--	--	--	0.0
Baetis	59	12	35.5	--	--	--	0.0	2	6	4	4.0
Ephemerella	58	--	29.0	--	--	--	0.0	--	--	--	0.0
Ephemera	--	--	0.0	--	--	--	0.0	--	2	--	0.7
Stenonema	--	16	8.0	6	22	64	30.7	1	16	8	8.3
Choroterpes	--	128	64.0	14	30	10	18.0	2	68	8	26.0
Leptophlebia	--	--	0.0	--	--	76	25.3	--	--	196	65.3
Paraleptophlebia	--	--	0.0	--	--	2	0.7	--	--	--	0.0
Tricorythodes	75	--	37.5	12	--	--	4.0	16	4	4	8.0
HEM: Hesperocorixa vulgaris (A)	--	--	0.0	--	--	2	0.7	--	--	--	0.0
Ambrysus mormon (A)	2	4	3.0	8	--	--	2.7	--	--	4	1.3
Saldidae (L)	2	--	1.0	--	--	--	0.0	--	--	--	0.0

(1) Riffle samplers were found out of water on 9/05/78 and on 11/05/79 due to a sudden drop in river stage.
(2) Riffle to pool samplers could not be located and retrieved on 10/08/78.
(3) Pool samplers were found out of water on 9/05/78 due to a sudden drop in river stage.

Sampling Location: a--T06S,R42E,31D.

Table D71. Continued (the second page of two pages).

Taxa/Collection Date	Riffle Habitat (1) 1978 10/08a	Riffle Habitat (1) 1979 9/15a	Riffle Habitat (1) Means	Riffle to Pool Habitat(2) 1978 9/05a	Riffle to Pool Habitat(2) 1979 9/15a	Riffle to Pool Habitat(2) 1979 11/05a	Riffle to Pool Habitat(2) Means	Pool Habitat(3) 1978 10/08a	Pool Habitat(3) 1979 9/15a	Pool Habitat(3) 1979 11/05a	Pool Habitat(3) Means
ANI:Ophiogomphus	--	--	0.0	--	--	--	0.0	--	2	--	0.7
PLE:Chloroperlidae	26t	--	13.0t	--	--	--	0.0	--	--	--	0.0
Acroneuria	--	1	0.5	--	--	2	0.7	--	4	--	1.3
TRI:Brachycentrus	--	--	0.0	2	--	--	0.7	--	--	--	0.0
Helicopsyche	--	8	4.0	--	--	48	16.0	--	--	--	0.0
Cheumatopsyche	6	--	3.0	6	--	--	2.0	1	--	--	0.3
Hydropsyche	9	--	4.5	--	2	48	16.7	--	18	--	6.0
Hydroptila	6	--	3.0	--	--	28	9.3	--	--	12	4.0
Ithytrichia	1	--	0.5	--	--	--	0.0	--	--	--	0.0
Nectopsyche	36	44	40.0	412	4	332	249.3	97	28	36	53.7
Oecetis	--	8	4.0	--	--	2	0.7	--	4	16	6.7
Polycentropus	--	--	0.0	--	--	--	0.0	1t	--	--	0.3t
AMP:Hyalella azteca	--	--	0.0	--	--	8	2.7	--	--	4	1.3
HIR:Hirudinea	2	--	1.0	2	--	--	0.7	--	--	--	0.0
Placobdella papillifera	--	1	0.5	--	--	--	0.0	--	--	--	0.0
OLI:Oligochaeta	--	--	0.0	--	1	--	0.3	2	--	24	8.7
GAS:Physa	1	24	12.5	--	3	2	1.7	--	16	20	12.0
PEL:Pelecypoda	--	--	0.0	--	--	--	0.0	--	1	--	0.3
TUR:Turbellaria	82	148	115.0	54	12	12	26.0	4	72	28	34.7
Totals	544	570	557.0 (1114)	638	106	750	498.4 (1494)	130	323	600	350.9 (1053)

(1) Riffle samplers were found out of water on 9/05/78 and on 11/05/79 due to a sudden drop in river stage.
(2) Riffle to pool samplers could not be located and retrieved on 10/08/78.
(3) Pool samplers were found out of water on 9/05/78 due to a sudden drop in river stage.

Sampling Location: a--T06S,R42E,31D.

Table D72. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Squirrel Creek near Decker station.

Taxa/Collection Date	Riffle Habitat			Riffle to Pool Habitat			Pool Habitat		
	9/15/79a	11/06/79a	Means	9/15/79a	11/06/79a	Means	9/15/79a	11/06/79a	Means
COL: Dubiraphia (L)	4	--	2.0	184	164	174.0	141	41	91.0
Dubiraphia (A)	--	--	0.0	--	8	4.0	--	--	0.0
Microcylloepus (L)	--	8	4.0	--	--	0.0	--	--	0.0
Microcylloepus pusillus (A)	--	--	0.0	24	--	12.0	--	--	0.0
Optioservus (L)	12	--	6.0	8	16	12.0	--	--	0.0
Stenelmis (L)	--	--	0.0	4	--	2.0	--	--	0.0
DIP: Bezzia-Probezzia	--	4	2.0	--	--	0.0	--	--	0.0
Chironomidae	268	360	314.0	476	412	444.0	90	69	79.5
Hemerodromia	16t	12t	14.0t	12t	--	6.0t	--	--	0.0
Muscidae	--	8	4.0	--	--	0.0	--	--	0.0
Simulium	56	148	102.0	4	40	22.0	--	--	0.0
Dicranota	--	28	14.0	--	--	0.0	--	--	0.0
EPH: Baetis	--	--	0.0	--	--	0.0	--	1	0.5
Caenis	--	--	0.0	8	24	16.0	6	1	3.5
HEM: Ambrysus mormon (A)	--	--	0.0	--	4	2.0	--	--	0.0
MEG: Sialis	--	--	0.0	--	--	0.0	3	--	1.5
ANI: Aeshna	--	--	0.0	--	--	0.0	1	1	1.0
ZYG: Ischnura	--	--	0.0	--	4	2.0	1	4	2.5
TRI: Brachycentrus	--	8	4.0	16	24	20.0	--	--	0.0
Cheumatopsyche	164	152	158.0	120	216	168.0	2	--	1.0
Hydropsyche	1024	508	766.0	68	300	184.0	2	2	2.0
Hydroptila	12	16	14.0	16	36	26.0	--	--	0.0
Ptilostomis	--	--	0.0	--	1	0.5	--	3	1.5
Polycentropus	--	--	0.0	16	--	8.0	10	1	5.5
AMP: Hyalella azteca	--	--	0.0	--	--	0.0	--	2	1.0
ACA: Acari	--	4	2.0	--	4	2.0	--	--	0.0
HIR: Placobdella papillifera	--	--	0.0	--	--	0.0	1	--	0.5
GAS: Gyraulus	--	4	2.0	--	--	0.0	--	--	0.0
Physa	--	--	0.0	16	36	26.0	2	1	1.5
Totals	1556	1260	1408.0 (2816)	972	1289	1130.5 (2261)	259	126	192.5 (385)

Sampling Location: a--T09S,R40E,29CD.

Table D73. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the upper Hanging Woman Creek near Quietus-Decker station (1).

Taxa/Collection Date	9/05/78a	9/14/79b	11/05/79b	Means
COL:Helichus striatus (A)	--	2	--	0.7
Dubiraphia (L)	1	--	--	0.3
Dubiraphia (A)	--	--	--	0.0
Microcylloepus (L)	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	--	0.0
Chironomidae	20	6	38	21.3
Hemerodromia	1t	--	--	0.3t
Simulium (L)	251	4	269	174.7
Simulium (P)	--	--	--	0.0
Tipulidae	--	--	--	0.0
EPH:Baetis	--	--	--	0.0
Caenis	--	--	--	0.0
Choroterpes	--	--	--	0.0
HEM:Corixidae (A)	--	--	--	0.0
Ambrysus mormon (A)	--	2	--	0.7
MEG:Sialis	--	--	--	0.0
ZYG:Hetaerina	--	10	16	8.7
Hetaerina americana	12	--	--	4.0
Argia	--	--	--	0.0
Ischnura	1	--	--	0.3
TRI:Cheumatopsyche	242	79	91	137.3
Hydropsyche	9	10	2	7.0
Hydroptila	--	--	3	1.0
Ithytrichia	2	p	--	0.7
Limnephilus	--	--	3	1.0
Polycentropus	--	--	--	0.0
AMP:Hyalella azteca	--	1	--	0.3
OST:Ostracoda	--	--	--	0.0
ACA:Acari	--	--	1	0.3
GAS:Gyraulus	--	1	5	2.0
Physa	5	196	68	89.7
Columnella	--	--	--	0.0
Totals	544	311	496	450.3 (1351)

(1) Riffle samplers were found crushed on 10/07/78 due to cattle trampling and were discarded.

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D.

Table D74. Numbers of benthic macroinvertebrares collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the upper Hanging Woman Creek near Quietus-Decker station.

Taxa/Collection Date	9/05/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL: Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	--	30	--	7.5
Dubiraphia (A)	--	--	--	--	0.0
Microcylloepus (L)	--	--	--	--	0.0
DIP: Bezzia-Probezzia	--	--	4	--	1.0
Chironomidae	9	8	146	123	71.5
Hemerodromia	--	--	--	4t	1.0t
Simulium (L)	31	--	--	31	15.5
Simulium (P)	26	--	--	--	6.5
Tipulidae	--	--	2	--	0.5
EPH: Baetis	--	--	2	--	0.5
Caenis	1	3	4	--	2.0
Choroterpes	--	--	--	--	0.0
HEM: Corixidae (A)	1	--	--	--	0.3
Ambrysus mormon (A)	4	--	--	1	1.3
MEG: Sialis	--	--	2	--	0.5
ZYG: Hetaerina	--	--	2	15	4.3
Hetaerina americana	2	2	--	--	1.0
Argia	--	--	8	--	2.0
Ischnura	--	--	--	--	0.0
TRI: Cheumatopsyche	343	1	2	26	93.0
Hydropsyche	34	--	--	1	8.8
Hydroptila	--	--	--	19	4.8
Ithytrichia	1	--	--	--	0.3
Limnephilus	--	--	--	11	2.8
Polycentropus	2	3	24	--	7.3
AMP: Hyalella azteca	2	3	4	16	6.3
OST: Ostracoda	--	--	2	--	0.5
ACA: Acari	--	--	--	--	0.0
GAS: Gyraulus	1	--	--	20	5.3
Physa	95	4	16	194	77.3
Columnella	--	--	--	--	0.0
Totals	552	24	248	461	321.8 (1285)

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D.

Table D75. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the upper Hanging Woman Creek near Quietus-Decker station.

Taxa/Collection Date	9/05/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL: Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	1	26	--	6.8
Dubiraphia (A)	--	--	2	--	0.5
Microcylloepus (L)	--	--	--	1	0.3
DIP: Bezzia-Probezzia	--	--	--	--	0.0
Chironomidae	13	11	46	97	41.8
Hemerodromia	--	--	--	--	0.0
Simulium (L)	1	--	--	8	2.3
Simulium (P)	--	--	--	--	0.0
Tipulidae	--	--	--	--	0.0
EPH: Baetis	--	--	--	--	0.0
Caenis	10	32	54	4	25.0
Choroterpes	--	--	--	1	0.3
HEM: Corixidae (A)	--	--	--	--	0.0
Ambrysus mormon (A)	--	--	--	--	0.0
MEG: Sialis	--	--	--	--	0.0
ZYG: Hetaerina	--	--	--	--	0.0
Hetaerina americana	--	--	--	--	0.0
Argia	2	--	8	2	3.0
Ischnura	4	6	--	4	3.5
TRI: Cheumatopsyche	104	1	4	--	27.3
Hydropsyche	13	--	--	1	3.5
Hydroptila	--	--	--	1	0.3
Ithytrichia	1	--	--	--	0.3
Limnephilus	--	--	--	1	0.3
Polycentropus	6	10	--	1	4.3
AMP: Hyalella azteca	--	9	12	7	7.0
OST: Ostracoda	--	--	--	--	0.0
ACA: Acari	--	--	--	--	0.0
GAS: Gyraulus	--	--	--	3	0.8
Physa	6	--	6	14	6.5
Columnella	--	--	p	--	p
Totals	160	70	158	145	133.8 (533)

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D.

Table D76. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the lower Hanging Woman Creek near Birney station.

Taxa/Collection Date	9/09/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL:Curculionidae (L)	--	--	4	--	1.0
Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	--	--	--	0.0
Dubiraphia (A)	--	--	4	--	1.0
Microcylloepus (L)	--	--	8	--	2.0
Microcylloepus (A)	--	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	--	--	0.0
Chironomidae	18	64	164	1048	323.5
Hemerodromia	--	--	64t	32t	24.0t
Simulium (L)	555	1230	572	1776	1033.3
Simulium (P)	--	392	--	--	98.0
Dicranota	--	--	--	--	0.0
EPH:Baetis	--	--	4	--	1.0
Caenis	1	--	--	8	2.3
Paraleptophlebia	--	--	--	--	0.0
MEG:Sialis	--	--	--	--	0.0
ZYG:Hetaerina	--	1	4	2	1.8
Coenagrionidae	--	--	--	--	0.0
Argia	--	--	--	--	0.0
Ischnura	--	--	--	--	0.0
TRI:Brachycentrus	--	--	--	--	0.0
Helicopsyche	--	--	--	--	0.0
Cheumatopsyche	24	139	748	1072	495.8
Hydropsyche	25	36	256	520	209.3
Hydroptila	1	--	--	96	24.3
Ithytrichia	--	--	--	--	0.0
Oecetis	--	--	--	--	0.0
Nyctiophylax	--	--	--	--	0.0
Polycentropus	--	--	--	--	0.0
OLI:Oligochaeta	--	--	--	--	0.0
GAS:Physa	--	8	4	8	5.0
Totals	624	1870	1832	4562	2222.3 (8888)

Sampling Locations: a--T06S,R43E,18D; b--T06S,R43E,19D.

Table D77. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the lower Hanging Woman Creek near Birney station.

Taxa/Collection Date	9/09/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL: Curculionidae (L)	--	--	--	--	0.0
Helichus striatus (A)	--	--	--	2	0.5
Dubiraphia (L)	--	3	31	--	8.5
Dubiraphia (A)	--	--	--	2	0.5
Microcylloepus (L)	--	--	2	4	1.5
Microcylloepus (A)	--	--	1	--	0.3
DIP: Bezzia-Probezzia	--	--	3	--	0.8
Chironomidae	12	12	57	354	108.8
Hemerodromia	--	--	--	14t	3.5t
Simulium (L)	56	3	21	66	36.5
Simulium (P)	--	--	--	--	0.0
Dicranota	--	--	--	8	2.0
EPH: Baetis	--	--	--	2	0.5
Caenis	--	--	105	4	27.3
Paraleptophlebia	--	--	--	6	1.5
MEG: Sialis	--	--	2	--	0.5
ZYG: Hetaerina	--	3	--	16	4.8
Coenagrionidae	--	--	--	--	0.0
Argia	--	--	8	--	2.0
Ischnura	--	1t	--	--	0.3t
TRI: Brachycentrus	--	--	--	1	0.3
Helicopsyche	--	--	--	2	0.5
Cheumatopsyche	8	30	8	164	52.5
Hydropsyche	2	--	13	80	23.8
Hydroptila	--	--	--	68	17.0
Ithytrichia	--	--	1	--	0.3
Oecetis	--	--	--	6	1.5
Nyctiophylax	--	--	1	--	0.3
Polycentropus	--	--	8	--	2.0
OLI: Oligochaeta	--	--	1	--	0.3
GAS: Physa	42	8	14	62	31.5
Totals	120	60	276	861	329.8 (1317)

Sampling Locations: a--T06S,R43E,18D; b--T06S,R43E,19D.

Table D78. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the lower Hanging Woman Creek near Birney station.

Taxa/Collection Date	9/09/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL:Curculionidae (L)	--	--	--	--	0.0
Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	--	7	--	1.8
Dubiraphia (A)	--	--	--	--	0.0
Microcylloepus (L)	--	--	--	--	0.0
Microcylloepus (A)	--	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	--	--	0.0
Chironomidae	6	--	56	26	22.0
Hemerodromia	--	--	--	--	0.0
Simulium (L)	--	1	5	5	2.8
Simulium (P)	--	--	--	--	0.0
Dicranota	--	--	--	--	0.0
EPH:Baetis	--	--	--	--	0.0
Caenis	--	--	54	13	16.8
Paraleptophlebia	--	--	--	--	0.0
MEG:Sialis	--	--	1	--	0.3
ZYG:Hetaerina	--	--	--	--	0.0
Coenagrionidae	2	--	--	--	0.5
Argia	--	--	1	--	0.3
Ischnura	--	1	1	--	0.5
TRI:Brachycentrus	--	--	--	--	0.0
Helicopsyche	--	--	--	--	0.0
Cheumatopsyche	--	1	--	3	1.0
Hydropsyche	--	--	1	--	0.3
Hydroptila	--	--	--	1	0.3
Ithytrichia	--	--	--	--	0.0
Oecetis	--	--	--	--	0.0
Nyctiophylax	--	--	--	--	0.0
Polycentropus	--	--	4	--	1.0
OLI:Oligochaeta	--	--	--	--	0.0
GAS:Physa	3	3	6	--	3.0
Totals	11	6	136	48	50.6 (201)

Sampling Locations: a--T06S,R43E,18D; b--T06S,R43E,19D.

Table D79. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the East Fork of Hanging Woman Creek near Birney station.

	Riffle Habitat			Riffle to Pool Habitat			Pool Habitat		
Taxa/Collection Date	9/29/79a	11/05/79a	Means	9/29/79a	11/05/79a	Means	9/29/79a	11/05/79a	Means
COL:Helichus striatus(A)	3	--	1.5	--	--	0.0	--	--	0.0
DIP:Bezzia-Probezzia	--	4	2.0	--	1	0.5	--	--	0.0
Palpomyia	--	--	0.0	8	--	4.0	3	--	1.5
Chironomidae	2	52	27.0	1	6	3.5	17	55	36.0
Psychodidae	--	4	2.0	1	--	0.5	--	--	0.0
Simulium	33	260	146.5	--	29	14.5	12	2	7.0
Dicranota	--	8	4.0	1	--	0.5	--	--	0.0
Tipula	--	--	0.0	--	3	1.5	--	--	0.0
EPH:Baetis	59	272	165.5	36	39	37.5	6	5	5.5
Choroterpes	--	--	0.0	--	--	0.0	--	2	1.0
Paraleptophlebia	3	--	1.5	7	--	3.5	8	--	4.0
ANI:Aeshna	--	--	0.0	--	--	0.0	--	1	0.5
TRI:Cheumatopsyche	--	8	4.0	--	1	0.5	1	--	0.5
Hydropsyche	--	8	4.0	--	--	0.0	--	--	0.0
Hydroptila	--	20	10.0	--	1	0.5	1	3	2.0
Hesperophylax	7	76	41.5	15	24	19.5	--	--	0.0
Limnephilus	2	--	1.0	2	6	4.0	1	--	0.5
AMP:Hyalella azteca	--	4	2.0	3	3	3.0	--	--	0.0
ACA:Acari	--	--	0.0	3	--	1.5	--	--	0.0
OLI:Oligochaeta	--	--	0.0	18	14	16.0	8	5	6.5
GAS:Physa	--	4	2.0	5	1	3.0	--	--	0.0
Columnella	--	--	0.0	p	--	p	--	--	0.0
PEL:Pisidium	--	--	0.0	13	--	6.5	--	--	0.0
Totals	109	720	414.5 (829)	113	128	120.5 (241)	57	73	65.0 (130)

Sampling Location: T06S,R43E,20DA.

Table D80. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the lower Otter Creek near Ashland station (1).

Taxa/Collection Date	9/04/78a	9/29/79a	11/06/79a	Means
COL:Dubiraphia (L)	--	--	--	0.0
Microcylloepus (L)	--	16	24	13.3
Microcylloepus (A)	--	4	--	1.3
Stenelmis (L)	--	12	--	4.0
Stenelmis (A)	--	4	--	1.3
DIP:Bezzia-Probezzia	--	--	--	0.0
Chironomidae	102	204	3456	1254.0
Hemerodromia	4t	16t	8t	9.3t
Simulium	9	8	1704	573.7
EPH:Caenis	2	4	16	7.3
HEM:Ambrysus mormon (A)	8	--	--	2.7
MEG:Sialis	--	--	--	0.0
ANI:Gomphus	--	--	--	0.0
ZYG:Hetaerina	--	16	16	10.7
Argia	--	4	8	4.0
Ischnura	--	--	8	2.7
TRI:Cheumatopsyche	134	232	280	215.3
Hydropsyche	3	28	8	13.0
Hydroptila	27	140	80	82.3
Nectopsyche	--	--	--	0.0
Ptilostomis	--	--	--	0.0
Polycentropus	--	4	--	1.3
AMP:Hyalella azteca	--	--	--	0.0
OLI:Oligochaeta	--	--	--	0.0
GAS:Gyraulus	--	--	--	0.0
Physa	--	4	8	4.0
PEL:Pisidium	--	--	8	2.7
NMT:Nematomorpha	--	--	16	5.3
Totals	289	696	5640	2208.2 (6625)

(1) Riffle samplers could not be located and retrieved on 10/8/78 due to the development of a beaver dam in the riffle section.

Sampling Location: a--T03S,R44E,12C.

Table D81. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the lower Otter Creek near Ashland station.

Taxa/Collection Date	9/04/78a	10/08/79a	9/29/79a	11/06/79a	Means
COL:Dubiraphia (L)	--	--	4	--	1.0
Microcylloepus (L)	--	1	14	8	5.8
Microcylloepus (A)	--	--	--	--	0.0
Stenelmis (L)	--	--	2	--	0.5
Stenelmis (A)	--	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	2	--	0.5
Chironomidae	115	13	94	2552	693.5
Hemerodromia	--	1t	--	16t	4.3t
Simulium	2	--	2	48	13.0
EPH:Caenis	28	10	8	8	13.5
HEM:Ambrysus mormon (A)	--	--	--	--	0.0
MEG:Sialis	--	--	--	--	0.0
ANI:Gomphus	--	--	2	--	0.5
ZYG:Hetaerina	--	--	--	40	10.0
Argia	8	1	2	--	2.8
Ischnura	--	3	2	--	1.3
TRI:Cheumatopsyche	4	28	54	48	33.5
Hydropsyche	--	5	4	16	6.3
Hydroptila	17	4	10	128	39.8
Nectopsyche	--	--	--	--	0.0
Ptilostomis	--	--	--	--	0.0
Polycentropus	--	3	6	8	4.3
AMP:Hyalella azteca	--	1	--	--	0.3
OLI:Oligochaeta	--	--	--	--	0.0
GAS:Gyraulus	--	--	--	--	0.0
Physa	--	3	4	16	5.8
PEL:Pisidium	--	--	--	--	0.0
NMT:Nematomorpha	--	--	--	--	0.0
Totals	174	73	210	2888	836.7 (3345)

Sampling Location: a--T03S,R44E,12C.

Table D82. Numbers of benthic macroinvertebrares collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the lower Otter Creek near Ashland station.

Taxa/Collection Date	9/04/78a	10/08/78a	9/29/79a	11/06/79a	Means
COL:Dubiraphia (L)	--	1	3	--	1.0
Microcylloepus (L)	--	--	1	--	0.3
Microcylloepus (A)	--	--	--	--	0.0
Stenelmis (L)	--	2	1	--	0.8
Stenelmis (A)	--	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	1	--	0.3
Chironomidae	14	4	66	101	46.3
Hemerodromia	--	--	--	--	0.0
Simulium	--	--	1	2	0.8
EPH:Caenis	11	13	17	7	12.0
HEM:Ambrysus mormon (A)	--	--	--	--	0.0
MEG:Sialis	1	--	1	--	0.5
ANI:Gomphus	--	--	--	--	0.0
ZYG:Hetaerina	--	--	--	--	0.0
Argia	1	--	5	--	1.5
Ischnura	1t	3	--	1	1.3
TRI:Cheumatopsyche	--	2	1	2	1.3
Hydropsyche	--	--	--	--	0.0
Hydroptila	--	1	--	--	0.3
Nectopsyche	1	--	--	--	0.3
Ptilostomis	--	1t	--	--	0.3t
Polycentropus	--	2	9	--	2.8
AMP:Hyalella azteca	--	--	--	--	0.0
OLI:Oligochaeta	--	--	4	1	1.3
GAS:Gyraulus	1	--	--	--	0.3
Physa	2	--	4	1	1.8
PEL:Pisidium	--	--	--	--	0.0
NMT:Nematomorpha	--	--	--	--	0.0
Totals	32	29	114	115	73.2 (290)

Sampling Location: a--T03S,R44E,12C.

Table D83. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Pumpkin Creek near Miles City station (1).

	Riffle to Pool Habitat			Pool Habitat		
Taxa/Collection Date	9/06/78a	10/09/78a	Means	9/06/78a	10/09/78a	Means
COL:Microcylloepus (L)	16	--	8.0	--	--	0.0
Microcylloepus (A)	4	--	2.0	--	--	0.0
Stenelmis (A)	--	--	0.0	1	--	0.5
DIP:Bezzia-Probezzia	4	--	2.0	--	--	0.0
Chironomidae	276	52	164.0	8	57	32.5
Hemerodromia	4t	2t	3.0t	--	--	0.0
EPH:Baetis	--	2	1.0	--	--	0.0
Caenis	28	9	18.5	2	20	11.0
Tricorythodes	--	1	0.5	--	--	0.0
MEG:Sialis	--	--	0.0	--	1	0.5
ZYG:Coenagrionidae	--	1	0.5	--	--	0.0
Argia	--	--	0.0	1	--	0.5
Ischnura	--	--	0.0	1	--	0.5
TRI:Cheumatopsyche	100	52	76.0	2	14	8.0
Hydropsyche	8	2	5.0	1	--	0.5
Ithytrichia	4	--	2.0	4	--	2.0
Polycentropus	--	1	0.5	--	2	1.0
AMP:Hyalella azteca	--	11	5.5	2	2	2.0
Totals	444	133	288.5 (577)	22	96	59.0 (118)

(1) Riffle samplers were found out of water on 9/06/78 and on 10/09/78 due to a continuous drop in stream stage; riffle data from artificial substrates are not available for this site.

Sampling Location: a--T06N,R48E,35C.

Table D84. Numbers of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Mizpah Creek near Mizpah station.

Taxa/Collection Date	Riffle Habitat 9/06/78a	Riffle Habitat 10/09/78a	Riffle Habitat Means	Riffle to Pool Habitat(1) 9/06/78a	Pool Habitat 9/06/78a	Pool Habitat 10/09/78a	Pool Habitat Means
COL:Helichus striatus (A)	1	--	0.5	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	0.0	--	--	1	0.5
Chironomidae	1	23	12.0	8	--	7	3.5
EPH:Baetis	--	1	0.5	--	--	--	0.0
Caenis	--	64	32.0	--	--	2	1.0
HEM:Ambrysus mormon (A)	2	--	1.0	--	--	--	0.0
ZYG:Argia	--	--	0.0	2	--	--	0.0
Ischnura	--	2	1.0	--	--	--	0.0
TRI:Cheumatopsyche	--	2	1.0	--	--	--	0.0
AMP:Hyalella azteca	--	2	1.0	1	2	--	1.0
OLI:Oligochaeta	--	--	0.0	--	--	4	2.0
GAS:Physa	1	3	2.0	25	9	1	5.0
Totals	5	97	51.0 (102)	36	11	15	13.0 (26)

(1) Riffle to pool samplers were found buried on 10/08/78 and not assessed.

Sampling Location: a--T06N,R51E,25C.

This sheet is intended as a filler for a set of 33 appendix tables ("E" series) that will be prepared for inclusion into this data report once the requisite data are at hand. The availability of this data and the preparation of these tables is anticipated for the near future. These "E" tables will be similar in sequence, organization, and content to the "C" series of the appendix which lists the macroinvertebrate-Surber density numbers by sample, station, and taxa. But in the case of the "E" tables, a biomass as an air-dried weight in milligrams per square foot will be presented for each taxa and Surber sample collection rather than a density value. These extra tables will entail an additional 39 pages for the report.

Tables E85 to E117

Biomass (milligrams of air-dried weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from various streams draining the southern Fort Union region in southeastern Montana.

This sheet is intended as a filler for a set of 17 appendix tables ("F" series) that will be prepared for inclusion into this data report once the requisite data are at hand. The availability of this data and the preparation of these tables is anticipated for the near future. These "F" tables will be similar in sequence, organization, and content to the "D" series of the appendix which lists by sample, station, and taxa the macroinvertebrate numbers collected with the duplicate jumbo multiplate samplers. But in the case of the "F" tables, a biomass as an air-dried weight in milligrams will be presented for each taxa and duplicate jumbo multiplate collection rather than the individual count tabulations. These extra tables will entail an additional 18 pages for the report.

Tables F118 to F134

Biomass (milligrams of air-dried weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into different types of stream habitats at the various intensive stations of the coal-field study area.

Table E85. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Rosebud Creek near Kirby during the 1978 sampling season.

Taxa/Collection Date	6/16	6/29	7/18	8/03	8/29	9/05	10/08	11/05
COL: Agabus (A)	--	--	--	--	--	10.8	--	--
Dubiraphia (L)	0.2	--	1.0	0.8	--	--	--	--
Dubiraphia (A)	--	--	0.7	--	--	--	--	--
Microcylloepus (L)	--	--	1.1	--	--	--	0.2	--
Microcylloepus (A)	--	--	--	--	0.4	--	--	--
Optioservus (L)	0.7	--	--	2.8	--	--	--	--
Optioservus divergens (A)	--	--	--	--	0.8	--	--	--
quadrimaculatus (A)	0.4	--	--	--	--	--	--	--
Hydrochus (L)	--	--	--	--	--	--	--	--
DIP: Bezzia-Probezzia	0.2	--	--	--	0.4	--	--	--
Chironomidae	5.4	1.1	28.6	166.	52.1	20.2	6.6	13.1
Clinocera-Chelifera	--	--	--	--	1.6	--	--	--
Hemerodromia	--	--	0.2	2.0	0.6	0.2	--	--
Simulium (L)	2.0	1.0	--	--	2.0	--	1.0	3.0
Simulium (P)	0.4	--	--	--	--	--	--	--
Dicranota	1.0	--	--	--	--	--	--	--
Tipula	--	--	--	136.	--	--	--	--
EPH: Baetis	12.3	1.3	5.9	3.5	35.5	2.2	1.0	26.2
Heptageniidae	--	--	--	--	1.2	--	--	--
Leptophlebiidae	--	--	--	--	1.8	--	--	--
Tricorythodes	--	--	5.4	2.2	--	0.1	0.5	0.2
MEG: Sialis	0.5	--	--	--	--	--	--	--
ANI: Anisoptera	--	--	--	--	--	--	--	--
Ophiogomphus	--	--	--	117.	--	--	--	--
PLE: Perlodidae	--	--	--	--	--	--	--	--
Isogenus	--	--	--	--	--	--	2.2	--
Isoperla	--	--	--	--	--	--	--	5.6
TRI: Brachycentrus	2.2	2.2	68.3	313.	19.1	22.2	94.5	65.2
Cheumatopsyche	3.8	0.8	1.5	31.2	109.	38.0	421.	76.4
Hydropsyche	2.7	0.9	0.3	2.0	165.	204.	--	243.
Hydroptila	10.4	--	171.	55.7	6.2	0.5	1.6	9.6
Ochrotrichia	--	--	--	6.4	--	--	--	--
AMP: Hyalella azteca	0.5	--	--	--	--	--	--	0.5
ACA: Acari	0.6	--	30.1	--	1.8	--	--	3.1
HIR: Hirudinea	--	--	--	--	2.2	--	--	--
OLI: Oligochaeta	135.	--	13.6	1.6	--	--	--	2.8
GAS: Ferrissia	--	--	--	--	--	--	4.4	4.4
Gyraulus	--	--	p	--	--	--	--	p
Physa	5.9	--	--	--	--	--	--	--
PEL: Pisidum	--	--	18.0	--	--	--	--	--
Totals	184.	7.3	346.	840.	400.	298.	533.	453.

Table E86. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Rosebud Creek near Kirby during the 1979 sampling season.

Taxa/Collection Date	4/01	5/20	6/21	7/27	8/17	9/05	Two-Year Means
COL: Agabus (A)	--	--	--	--	--	--	0.8
Dubiraphia (L)	--	--	3.4	--	--	--	0.4
Dubiraphia (A)	--	--	--	--	--	--	<.1
Microcylloepus (L)	--	--	1.1	--	0.4	--	0.2
Microcylloepus (A)	--	--	--	0.9	0.5	2.8	0.3
Optioservus (L)	--	--	--	1.1	--	7.6	0.9
Optioservus divergens (A)	--	--	--	--	--	1.6	0.2
quadrimaculatus (A)	--	--	--	--	--	--	<.1
Hydrochus (L)	--	--	0.6	--	--	--	<.1
DIP: Bezzia-Probezzia	--	0.4	--	--	--	--	0.1
Chironomidae	--	15.2	28.8	10.0	29.0	39.5	29.7
Clinocera-Chelifera	--	--	--	--	0.9	1.2	0.3
Hemerodromia	--	--	0.3	--	3.4	1.2	0.6
Simulium (L)	--	--	5.7	--	--	--	1.1
Simulium (P)	--	--	--	--	--	--	<.1
Dicranota	--	--	--	--	--	--	0.1
Tipula	--	--	--	--	--	--	9.7
EPH: Baetis	0.3	1.6	5.1	0.9	21.0	10.4	9.1
Heptageniidae	--	--	--	--	--	--	0.1
Leptophlebiidae	--	--	--	--	3.6	--	0.4
Tricorythodes	--	--	10.4	5.2	21.1	15.2	4.3
MEG: Sialis	--	--	--	--	--	--	<.1
ANI: Anisoptera	--	--	41.6	--	--	--	3.0
Ophiogomphus	--	--	--	--	--	--	8.4
PLE: Perlodidae	--	--	0.1	--	--	--	<.1
Isogenus	--	--	--	--	--	--	0.2
Isoperla	--	14.3	--	--	--	--	1.4
TRI: Brachycentrus	p	--	74.4	8.0	2.4	5.2	48.3
Cheumatopsyche	--	0.4	2.0	54.9	52.1	228.	72.8
Hydropsyche	--	104.	139.	161.	242.	206.	105.0
Hydroptila	--	2.1	9.8	28.8	13.6	13.8	23.1
Ochrotrichia	--	--	--	--	--	--	0.5
AMP: Hyalella azteca	--	--	--	--	--	--	0.1
ACA: Acari	--	--	0.1	0.1	--	1.2	2.6
HIR: Hirudinea	--	--	--	--	--	--	0.2
OLI: Oligochaeta	--	0.5	--	--	--	--	11.0
GAS: Ferrissia	--	--	--	--	--	--	0.6
Gyraulus	--	--	p	--	p	--	p
Physa	--	--	--	--	--	--	0.4
PEL: Pisidium	--	--	--	--	--	--	1.3
Totals	0.3	139.	322.	271.	390.	534.	377.2 (4718)

Table E87. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from middle Rosebud Creek near Colstrip and from lower Rosebud Creek near Rosebud.

Taxa/Collection Date	Rosebud-Colstrip 7/12/78	8/22/78	8/24/79	Means	Rosebud-Rosebud 11/07/79	Overall Means
COL: Curculionidae (L)	--	--	--	--	8.8	2.2
Hyperodes (L)	--	4.4	--	1.5	--	1.1
Dubiraphia (L)	0.2	0.6	--	0.3	--	0.2
Dubiraphia (A)	0.1	0.1	--	0.1	--	<.1
Microcylloepus (L)	0.4	3.5	0.3	1.4	0.7	1.2
Microcylloepus (A)	0.7	--	--	0.2	--	0.2
Microcylloepus pusillus (A)	--	0.2	--	0.1	--	<.1
Stenelmis (L)	0.9	4.0	0.9	1.9	--	1.5
Stenelmis sinuata (A)	1.1	--	--	0.4	--	0.3
Stenelmis vittipennis (A)	--	1.4	--	0.5	--	0.4
DIP: Chironomidae	0.7	4.8	0.4	2.0	11.6	4.4
Hemerodromia	0.1	0.1	--	0.1	2.4	0.7
Simulium	2.2	--	0.1	0.8	31.9	8.6
Tipula	--	5.4	--	1.8	--	1.4
EPH: Baetis	0.8	1.7	0.6	1.0	--	0.8
Pseudocloeon	--	--	0.5	0.2	--	0.1
Choroterpes	0.4	0.4	--	0.3	11.0	3.0
Choroterpes-Leptophlebia	--	--	46.3	15.4	--	11.6
Paraleptophlebia	--	7.2	--	2.4	--	1.8
Ephoron	0.9	--	--	0.3	--	0.2
Tricorythodes	0.1	0.2	--	0.1	0.5	0.2
HEM: Ambrysus mormon (A)	7.7	42.3	47.0	32.3	--	24.3
LEP: Parargyractis	--	--	--	--	1.8	0.5
ANI: Ophiogomphus	11.8	--	--	3.9	--	3.0
TRI: Brachycentrus	--	22.1	8.3	10.1	--	7.6
Culoptila	--	--	--	--	0.7	0.2
Cheumatopsyche	0.3	13.3	1.5	5.0	200.	53.8
Hydropsyche	15.5	17.8	3.1	12.1	554.	148.
Hydroptila	--	--	--	--	3.7	0.9
Ithytrichia	--	0.2	--	0.1	--	<.1
ACA: Acari	--	0.1	--	<.1	--	<.1
HIR: Hirudinea	--	--	11.3	3.8	--	2.8
OLI: Oligochaeta	0.7	0.9	--	0.5	--	0.4
GAS: Ferrissia	p	--	--	p	--	p
Physa	--	5.5	--	1.8	5.9	2.9
PEL: Sphaerium	48.5	--	--	16.2	--	12.1
TUR: Turbellaria	--	5.2	--	1.7	--	1.3
Totals	93.1	141.	120.	118. (354.)	833.	298. (1187)

Table E88. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Indian Creek near Kirby.

	1978 Samples			1979 Samples			
Taxa/Collection Date	7/25	8/24	11/05	6/26	7/17	9/28	Means
COL: Agabus (L)	--	--	--	1.2	--	--	0.2
Dubiraphia (L)	--	0.3	1.4	1.1	--	--	0.5
Dubiraphia (A)	--	0.3	0.7	--	--	--	0.2
Microcylloepus (L)	0.6	--	--	0.2	0.4	0.8	0.3
Microcylloepus (A)	--	--	--	--	0.8	1.6	0.4
Microcylloepus pusillus (A)	--	--	--	0.9	--	--	0.2
Optioservus (L)	31.4	6.8	10.4	17.4	1.2	47.1	19.1
Optioservus (A)	9.1	--	--	--	--	--	1.5
Optioservus divergens (A)	--	--	1.2	9.6	--	3.9	2.5
quadrimaculatus (A)	--	--	--	3.2	--	--	0.5
Heteroceridae (L)	0.6	--	--	--	--	--	0.1
Berosus (L)	--	--	--	--	3.2	--	0.5
DIP: Bezzia-Probezzia	--	--	0.2	--	--	--	<.1
Chironomidae	5.3	9.9	19.5	21.0	167.	16.4	39.9
Clinocera-Chelifera	--	0.8	0.6	--	0.8	0.6	0.5
Hemerodromia	0.4	0.2	0.1	--	1.7	1.8	0.7
Muscidae	--	--	--	--	39.6	--	6.6
Pericoma	--	--	0.5	--	8.0	--	1.4
Simulium	0.9	--	0.5	0.5	63.9	--	11.0
Euparyphus	--	--	6.2	--	--	--	1.0
Tipulidae	--	--	--	--	--	172.	28.7
Dicranota	14.1	--	3.0	--	25.2	317.	59.9
Tipula	13.7	--	13.7	13.7	--	--	6.9
EPH: Baetidae	--	--	--	p	--	--	p
Baetis	6.3	0.1	0.1	--	--	1.6	1.4
Caenis	3.9	--	35.2	--	--	--	6.5
Tricorythodes	--	1.7	0.6	--	--	--	0.4
ANI: Ophiogomphus	--	75.1	35.4	--	--	--	18.4
PLE: Isoperla	--	0.5	0.5	--	--	--	0.2
TRI: Brachycentrus	217.	33.2	41.9	10.4	--	109.	68.6
Cheumatopsyche	14.9	0.8	--	0.8	1442	528.	331.
Hydropsyche	39.3	24.1	166.	18.2	167.	2554	495.
Potamyia	0.2	--	--	--	--	--	<.1
Hydroptila	4.8	2.1	35.6	14.8	20.4	19.2	16.2
Ochrotrichia	1.6	--	--	--	--	--	0.3
Oecetis	--	4.4	--	--	--	--	0.7
Onocosmoecus	--	--	--	24.7	--	--	4.1
AMP: Gammarus	--	--	--	--	--	31.2	5.2
Hyalella azteca	12.1	0.4	--	0.6	--	1.3	2.4
ACA: Acari	0.1	2.2	8.1	0.8	11.6	8.6	5.2
OLI: Oligochaeta	516.	0.3	58.4	234.	--	185.	166.
GAS: Lymnaea	5.4	--	--	--	--	--	0.9
Gyraulus	p	p	16.5	p	p	p	2.8
Physa	--	--	--	p	--	--	p
Columnella	--	--	p	--	--	--	p
PEL: Pisidium	5.4	--	--	p	--	--	0.9
Totals	903.	163.	456.	373.	1953	3999	1309 (7847)

Table E89. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Davis Creek near Busby.

Taxa/Collection Date	6/26/78	7/25/78	8/24/79	Means
COL: Agabus (L)	1.4	2.9	--	1.4
Agabus (A)	--	--	10.8	3.6
Deronectes-Oerodytes (A)	2.6	--	--	0.9
Deronectes liodessus (A)	--	2.6	--	0.9
Hydroporus-Hygrotus (L)	--	0.2	--	0.1
Dubiraphia (L)	0.9	1.8	1.0	1.2
Dubiraphia (A)	4.4	0.9	--	1.8
Dubiraphia vittata (A)	--	--	8.1	2.7
Gyrinis-Gyretes (L)	--	0.2	--	0.1
Limnichidae (L)	0.2	--	--	0.1
DIP: Bezzia-Probezzia	--	0.7	--	0.2
Chironomidae	2.6	44.8	8.8	18.7
Clinocera-Chelifera	--	1.9	--	0.6
Simulium	0.9	7.7	--	2.9
Stratiomyidae	--	2.6	--	0.9
Odontomyia	2.6	--	--	0.9
Chrysops	--	4.7	--	1.6
Tabanus	--	--	5.3	1.8
Tipula	33.9	--	--	11.3
EPH: Baetis	1.3	1.3	1.0	1.2
Caenis	0.6	2.7	2.1	1.8
HEM: Heteroptera (L)	0.1	--	--	<.1
Heteroptera (A)	0.1	--	--	<.1
Hesperocorixa laevigata (A)	--	10.5	--	3.5
MEG: Sialis	2.0	33.2	1.8	12.3
ZYG: Coenagrionidae	--	--	3.5	1.2
Ischnura	--	3.0	--	1.0
TRI: Cheumatopsyche	9.3	0.7	104.	38.0
Hydroptila	0.4	--	--	0.1
Hesperophylax	--	4.5	97.9	34.1
Limnephilus	--	4.4	--	1.5
Ptilostomis	--	--	7.8	2.6
AMP: Hyalella azteca	7.0	9.6	19.1	11.9
OST: Ostracoda	0.3	--	1.6	0.6
ACA: Acari	0.3	--	0.3	0.2
HIR: Glossiphonia	19.0	--	--	6.3
OLI: Oligochaeta	6.3	14.7	8.4	9.8
GAS: Gyraulus	p	p	--	p
Physa	1.3	30.4	5.3	12.3
Totals	97.5	186.	287.	190. (571.)

Table E90. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Muddy Creek near Busby-Lame Deer.

Taxa/Collection Date	6/26/78	7/25/78	5/20/79	8/24/79	Means
COL: Dubiraphia (L)	--	--	18.6	6.1	6.2
Dubiraphia (A)	--	0.4	0.4	--	0.2
Microcylloepus (L)	--	--	--	2.1	0.5
Optioservus (L)	--	--	0.8	--	0.2
DIP: Bezzia-Probezzia	0.2	--	--	--	<.1
Chironomidae	34.9	13.3	4.7	10.3	15.8
Simulium	0.4	9.3	--	1.4	2.8
Dicranota	--	10.4	--	--	2.6
EPH: Baetis	--	11.8	--	4.1	4.0
Caenis	21.9	0.9	6.6	--	7.4
Choroterpes	--	--	--	1.0	0.3
HEM: Ambrysus mormon (A)	--	--	6.1	92.1	24.6
TRI: Brachycentrus	--	6.5	--	--	1.6
Cheumatopsyche	3.9	236.	27.9	94.2	90.5
Hydropsyche	--	5.7	2.8	2.0	2.6
Hydroptila (L)	--	3.1	9.0	1.7	3.5
Hydroptila (P)	1.7	--	--	--	0.4
Oecetis	--	--	p	7.6	1.9
Onocosmoecus	--	--	16.5	--	4.1
AMP: Hyalella azteca	3.0	--	4.0	136.	35.8
ACA: Acari	--	--	1.8	0.2	0.5
HIR: Glossiphonia complanata	--	--	44.9	--	11.2
Helobdella	--	--	18.7	19.8	9.6
Helobdella stagnalis	--	--	45.4	--	11.4
OLI: Oligochaeta	4.1	--	4.1	22.0	7.6
Lymnaea	--	--	p	--	p
Gyraulus	--	p	p	p	p
Helisoma	--	--	p	--	p
Physa	27.7	--	p	55.3	20.8
PEL: Pisidium	--	--	83.2	25.6	27.2
NEM: Nematoda	--	--	--	0.6	0.2
Totals	97.8	297.	296.	482.	294. (1173)

Table E91. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Lame Deer Creek near Lame Deer.

Taxa/Collection Date	7/12/78	8/16/78	8/07/79	11/06/79	Means
COL: Dubiraphia (L)	--	0.2	--	0.8	0.3
Dubiraphia vittata (A)	--	--	8.6	--	2.2
Microcylloepus (L)	--	--	0.4	--	0.1
Optioservus (L)	10.4	1.0	10.6	1.9	6.0
Optioservus (A)	6.0	--	--	--	1.5
Optioservus divergens (A)	--	--	0.8	--	0.2
Haliplus (L)	--	--	0.8	--	0.2
DIP: Chironomidae	14.9	2.8	10.2	123.	37.7
Clinocera-Chelifera	--	0.3	--	--	0.1
Hydrellia	3.2	0.2	--	--	0.9
Simulium	1.0	0.1	0.1	29.6	7.7
Dicranota	10.8	--	--	--	2.7
EPH: Baetis	2.1	--	--	5.2	1.8
Caenis	--	--	0.6	--	0.2
Ameletus	--	--	--	3.4	0.9
HEM: Gerris (A)	--	29.1	--	--	7.3
ZYG: Ischnura	--	--	34.4	68.8	25.8
TRI: Brachycentrus	76.6	21.8	--	--	24.6
Cheumatopsyche	139.	1.3	62.3	2447	662.
Hydropsyche	1.9	2.4	1.9	110.	29.1
Hydroptila	--	--	32.6	5.8	9.6
Oecetis	--	--	35.2	--	8.8
Glyphopsyche	--	2.8	--	--	0.7
Hesperophylax	118.	--	--	--	29.5
AMP: Gammarus	28.8	--	111.	--	35.0
Hyallela azteca	20.8	0.5	146.	45.6	53.2
ACA: Acari	0.6	0.3	0.6	--	0.4
HIR: Erpobdellidae	--	--	66.7	--	16.7
Glossiphonia	--	--	209.	--	52.3
Helobdella stagnalis	--	--	13.8	--	3.5
OLI: Oligochaeta	--	0.4	--	--	0.1
GAS: Helisoma	--	--	38.2	--	9.6
Physa	47.3	29.6	p	--	19.2
PEL: Pisidium	4.9	4.9	4.9	--	3.7
Totals	486.	97.7	789.	2841	1054 (4214)

Table E92. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Tongue River near Sheridan-Decker.

Taxa/Collection Date	7/07/78	8/26/78	6/26/79	8/30/79	Means
COL:Dubiraphia (A)	--	--	0.4	--	0.1
Microcylloepus (L)	0.3	0.3	1.0	48.1	12.4
Microcylloepus (A)	--	--	0.8	--	0.2
Microcylloepus pusillus (A)	--	--	--	6.8	1.7
Stenelmis (L)	1.9	0.6	0.6	2.5	1.4
Stenelmis sinuata (A)	--	--	--	9.2	2.3
Stenelmis vittipennis (A)	--	--	2.3	--	0.6
Zaitzevia parvula (A)	--	--	1.1	--	0.3
DIP:Bezzia-Probezzia	--	--	0.7	--	0.2
Bezzia-Probezzia-Palpomyia	1.1	--	--	--	0.3
Chironomidae	2.8	4.7	22.2	20.2	12.5
Hermerodromia	--	--	0.2	--	<.1
Simulium (L)	4.3	15.6	5.7	14.8	10.1
Simulium (P)	--	4.7	--	--	1.2
EPH:Baetis	59.1	4.1	3.8	50.2	29.3
Pseudocloeon	3.1	--	0.3	3.2	1.7
Ephemera	1.1	--	--	--	0.3
Ephemerella	3.5	--	64.2	--	16.9
Heptageniidae	--	--	--	1.2	0.3
Rithrogena	--	0.3	--	--	0.1
Stenonema	--	0.5	--	--	0.1
Leptophlebiidae	--	0.9	--	--	0.2
Choroterpes-Leptophlebia	--	--	--	2.4	0.6
Ephoron	--	1.8	--	--	0.5
Tricorythodes	2.4	4.4	1.2	0.8	2.2
LEP:Paragyractis	--	--	0.8	16.0	4.2
Ophiogomphus	--	--	--	26.4	6.6
PLE:Isoperla	--	--	8.1	--	2.0
TRI:Brachycentrus	--	--	220.	14.8	58.7
Helicopsyche	--	--	--	54.2	13.6
Cheumatopsyche	87.6	4.2	24.9	129.	61.4
Hydropsyche	1.6	34.3	703.	111.	212.
Hydroptila	--	2.2	p	8.9	2.8
Ochrotrichia	--	0.5	--	8.0	2.1
Nectopsyche	--	2.1	--	--	0.5
Oecetis	5.3	--	2.7	117.	31.3
OLI:Oligochaeta	3.0	--	0.1	--	0.8
GAS:Gyraulus	p	--	--	--	p
PEL:Pisidium	6.2	--	--	--	1.6
Sphaerium	--	--	--	p	p
TUR:Turbellaria	--	--	--	84.8	21.2
Totals	183.	81.2	1064	730.	514. (2058)

Table E93. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Ash and Youngs Creeks near Sheridan-Decker.

	Ash Creek				Youngs Creek		
	1978	1979			1979		
Taxa/Collection Date	6/10	7/26	8/30	Means	7/13	8/30	Means
COL: Dubiraphia (L)	--	3.1	--	1.0	0.4	--	0.2
Dubiraphia (A)	--	--	--	--	--	0.7	0.4
Microcylloepus (L)	--	0.7	--	0.2	0.6	--	0.3
Microcylloepus (A)	--	0.9	--	0.3	--	--	--
Microcylloepus pusillus (A)	--	--	--	--	0.2	--	0.1
Optioservus (L)	--	--	1.1	0.4	0.8	--	0.4
DIP: Bezzia-Probezzia	--	3.0	--	1.0	--	--	--
Chironomidae	0.8	99.8	27.8	42.8	2.3	31.9	17.1
Clinocera-Chelifera	--	9.5	--	3.2	0.8	--	0.4
Hemerodromia	--	--	--	--	--	3.2	1.6
Muscidae	--	23.4	1.8	8.4	--	--	--
Simulium	0.3	33.7	8.8	14.3	0.3	3.4	1.9
Dicranota	--	40.8	40.8	27.2	--	--	--
Tipula	182.	--	--	60.7	--	--	--
EPH: Baetis	0.9	41.6	16.3	19.6	2.3	--	1.2
Pseudocloeon	0.3	3.2	--	1.2	--	--	--
Leptophlebiidae	--	--	p	p	--	--	--
Tricorythodes	--	--	--	--	--	0.5	0.3
ANI: Ophiogomphus	66.9	--	--	22.3	--	103.	51.5
PLE: Perlodidae	--	--	0.3	0.1	--	--	--
TRI: Brachycentrus	--	17.5	--	5.8	4.4	13.1	8.8
Cheumatopsyche	1.2	167.	54.9	74.4	15.7	57.5	36.6
Hydropsyche	33.3	313.	349.	232.	231.	361.	296.
Hydroptila	--	8.4	2.1	3.5	6.7	2.2	4.5
Ochrotrichia	--	--	3.3	1.1	0.8	--	0.4
Oecetis	--	p	--	p	--	--	--
Onocosmoecus	--	49.4	--	16.5	16.4	--	8.2
ACA: Acari	--	1.2	--	0.4	--	--	--
OLI: Oligochaeta	0.4	--	--	0.1	0.8	--	0.4
GAS: Lymnaea	--	--	--	--	p	--	p
Gyraulus	--	--	--	--	--	p	p
Physa	--	144.	28.8	57.6	p	13.0	6.5
PEL: Pisidium	--	--	--	--	--	p	p
Totals	286.	960.	535.	594. (1781)	284.	590.	437. (874.)

Table E94. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Tongue River near Pyramid Butte-Birney during the 1978 sampling season (the first page of two pages).

Taxa/Collection Date	6/28	7/19	8/03	8/24	9/05	10/08	11/04
COL: Dubiraphia (L)	0.4	0.4	0.2	--	--	--	0.4
Dubiraphia (A)	1.0	--	--	0.6	32.8	0.6	--
Dubiraphia vittata (A)	--	--	--	--	--	--	--
Microcylloepus (L)	5.9	--	0.4	6.5	159.	29.5	0.6
Microcylloepus (A)	0.6	--	1.5	0.1	328.	113.	4.6
Microcylloepus pusillus (A)	--	--	--	--	--	--	--
Stenelmis (L)	--	--	1.6	0.6	99.1	8.5	1.6
Stenelmis (A)	--	3.9	3.9	0.9	23.2	--	1.9
Stenelmis sinuata (A)	--	--	--	--	--	--	--
Stenelmis vittipennis (A)	--	--	--	--	--	--	--
Heteroceridae (L)	--	--	--	--	--	--	--
DIP: Brachycera	--	--	--	0.2	--	--	--
Ceratopogonidae	--	0.2	1.1	--	--	--	--
Bezzia-Probezzia	--	--	1.3	--	--	0.9	--
Bezzia-Probezzia-Palpomyia	--	--	--	0.2	--	--	--
Chironomidae	7.3	4.5	25.5	15.2	15.1	3.0	7.2
Hemerodromia	--	--	--	--	--	1.2	0.3
Simulium	23.3	6.8	0.1	0.1	8.8	14.5	31.0
Dicranota	--	--	--	--	--	--	--
EPH: Baetidae	--	--	--	--	15.7	--	--
Baetis	3.7	12.5	4.8	2.8	119.	6.9	3.9
Pseudocloeon	--	--	--	--	--	--	--
Ephemera	--	--	--	--	--	--	--
Ephemerella	1.2	0.6	--	--	--	12.0	50.0
Heptageniidae	--	--	--	--	1.6	--	0.8
Heptagenia	--	--	--	--	--	1.2	--
Stenonema	--	--	--	1.1	--	--	5.3
Leptophlebiidae	--	--	--	--	--	--	--
Choroterpes	--	0.6	10.4	13.5	--	--	--
Leptophebia	--	--	--	--	5.9	--	--
Choroterpes-Leptophlebia	--	--	--	--	50.2	1.1	--
Siphlonurus	--	--	--	--	--	--	--
Tricorythodes	5.0	3.2	9.3	11.3	7.7	9.7	2.0
HEM: Homoptera (L)	--	--	--	--	--	--	--
Ambrysus mormon (A)	--	--	p	1.8	--	--	--
LEP: Paragyractis	--	--	--	1.3	--	--	--
ANI: Gomphus	--	--	--	--	--	--	--
Ophiogomphus	--	--	--	27.6	--	--	--
PLE: Acroneuria	--	--	--	8.2	--	--	--
Perlodidae	--	--	--	--	4.0	13.5	5.9
Isoperla	--	--	--	0.1	--	--	--

Table E94. Continued (the second page of two pages).

Taxa/Collection Date	6/28	7/19	8/03	8/24	9/05	10/08	11/04
TRI:Helicopsyche	--	--	--	--	--	--	--
Cheumatopsyche	--	2.3	5.2	4.7	10.0	2.3	5.4
Hydropsyche	--	--	9.4	12.8	81.4	36.8	162.
Hydroptilidae (L)	--	--	--	--	--	--	--
Hydroptilidae (P)	--	--	--	--	--	--	--
Hydroptila	--	--	0.5	0.9	21.6	3.2	4.8
Ochrotrichia	--	--	--	--	10.4	--	--
Glossosomatidae	--	--	--	0.4	--	--	--
Leptoceridae (L)	--	--	--	5.6	--	--	--
Leptoceridae (P)	--	--	--	1.9	--	--	--
Nectopsyche	9.6	--	2.4	204.	28.0	8.6	25.2
Oecetis	--	--	--	24.6	--	13.0	48.4
OST:Ostracoda	--	--	0.5	--	--	--	--
ACA:Acari	--	--	--	--	--	--	0.3
OLI:Oligochaeta	--	--	--	--	--	--	--
GAS:Gastropoda	--	--	--	--	--	--	--
Ferrissia	--	--	--	--	--	--	--
Physa	--	--	--	--	--	--	--
Columnella	--	--	--	--	--	--	--
PEL:Pelecypoda	--	--	--	--	--	--	--
Pisidium	--	--	--	--	--	--	--
TUR:Turbellaria	--	--	--	--	60.8	26.0	26.3
Totals	58.0	35.0	78.1	347.	1082	306.	388.

Table E95. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Tongue River near Pyramid Butte-Birney during the 1979 sampling season (the first page of two pages).

Taxa/Collection Date	3/31	5/19	6/21	8/01	8/18	9/05	Two-Year Means
COL: Dubiraphia (L)	--	--	0.8	0.8	1.5	1.8	0.4
Dubiraphia (A)	--	--	--	--	--	--	2.7
Dubiraphia vittata (A)	--	--	--	--	2.4	--	0.2
Microcylloepus (L)	4.1	1.2	2.3	54.7	132.	83.8	36.9
Microcylloepus (A)	--	2.6	--	--	--	--	34.6
Microcylloepus pusillus (A)	3.6	--	4.6	49.2	82.8	83.1	17.2
Stenelmis (L)	--	--	--	18.4	12.6	15.9	12.2
Stenelmis (A)	--	--	--	22.2	--	--	4.3
Stenelmis sinuata (A)	--	9.9	3.6	--	--	--	1.0
Stenelmis vittipennis (A)	--	--	--	--	7.6	12.5	1.5
Heteroceridae (L)	--	--	--	1.3	--	--	0.1
DIP: Brachycera	--	--	--	--	--	--	<.1
Ceratopogonidae	--	--	--	--	--	--	0.1
Bezzia-Probezzia	--	0.5	21.2	--	--	--	1.8
Bezzia-Probezzia-Palpomyia	1.0	--	--	--	--	--	0.1
Chironomidae	92.6	14.7	43.6	41.7	15.5	6.8	22.5
Hemerodromia	--	--	--	2.1	--	--	0.3
Simulium	14.8	1.4	5.9	12.3	9.6	0.2	9.9
Dicranota	--	--	--	3.8	--	--	0.3
EPH: Baetidae	--	--	--	--	--	--	1.2
Baetis	15.6	2.6	30.2	24.4	13.6	3.8	18.8
Pseudocloeon	--	--	--	3.2	--	--	0.2
Ephemera	--	--	2.8	--	--	--	0.2
Ephemerella	55.6	59.6	11.4	3.7	--	--	14.9
Heptageniidae	0.4	--	--	--	--	--	0.2
Heptagenia	--	--	2.4	--	--	--	0.3
Stenonema	--	1.6	--	--	--	--	0.6
Leptophlebiidae	--	--	3.6	--	--	--	0.3
Choroterpes	--	0.1	--	1.7	--	11.6	2.9
Leptophlebia	--	--	--	--	--	--	0.5
Choropterpes-Leptophlebia	--	--	--	34.2	5.1	--	7.0
Siphlonurus	--	--	3.4	--	--	--	0.3
Tricorythodes	3.2	0.1	45.9	11.5	0.3	0.3	8.4
HEM: Homoptera (L)	--	--	--	0.2	--	--	<.1
Ambrysus mormon (A)	--	--	--	10.0	25.9	48.0	6.6
LEP: Parargyractis	--	--	--	15.8	2.6	--	1.5
ANI: Gomphus	--	--	--	--	8.4	--	0.6
Ophiogomphus	--	--	--	--	--	--	2.1
PLE: Acroneuria	--	--	--	16.4	--	--	1.9
Perlodidae	9.1	--	--	--	--	--	2.5
Isoperla	--	54.5	--	--	--	--	4.2

Table E95. Continued (the second page of two pages).

Taxa/Collection Date	3/31	5/19	6/21	8/01	8/18	9/05	Two Year Means
TRI:Helicopsyche	--	--	4.7	--	32.0	66.6	7.9
Cheumatopsyche	--	0.6	1.7	7.5	6.0	3.0	3.7
Hydropsyche	2.0	13.1	3.4	157.	72.4	62.9	47.2
Hydroptilidae (L)	--	--	--	--	132.	p	10.2
Hydroptilidae (P)	--	--	69.2	--	--	--	5.3
Hydroptila	--	6.1	10.9	72.5	166.	3.0	22.3
Ochrotrichia	--	--	10.4	3.5	58.9	1.7	6.5
Glossosomatidae	--	--	--	--	--	--	<.1
Leptoceridae (L)	--	--	--	--	--	--	0.4
Leptoceridae (P)	--	--	--	--	--	--	0.1
Nectopsyche	103.	12.7	--	111.	553.	15.2	82.5
Oecetis	1.5	--	16.8	17.6	44.0	23.8	14.6
OST:Ostracoda	--	--	--	--	--	--	<.1
ACA:Acari	--	--	0.6	0.6	0.6	--	0.2
OLI:Oligochaeta	--	--	3.6	--	2.4	--	0.5
GAS:Gastrapoda	--	--	--	--	--	p	p
Ferrissia	--	--	--	p	--	--	p
Physa	11.7	p	50.6	253.	443.	9.2	59.0
Columnella	--	--	--	--	--	p	p
PEL:Pelecypoda	--	--	p	--	--	--	p
Pisidium	--	--	--	13.4	--	--	1.0
TUR:Turbellaria	0.9	--	5.3	--	9.9	34.0	12.6
Totals	319.	181.	359.	964.	1840	487.	495. (6444)

Table E96. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Squirrel Creek near Decker.

	1978 Samples		1979 Samples							
Taxa/Collection Date	6/10	8/26	4/01	5/20	6/21	7/26	8/17	9/05	11/06	Means
COL: Helichus (A)	--	--	--	--	--	9.3	--	--	--	1.0
Helichus striatus (A)	4.7	--	--	--	--	--	--	--	--	0.5
Dubiraphia (L)	--	2.0	24.3	0.8	19.6	7.9	1.1	4.6	2.7	7.0
Dubiraphia vittata (A)	--	2.7	2.7	--	--	--	--	--	--	0.6
Microcylloepus (L)	--	1.5	0.7	--	0.7	--	1.5	1.5	--	0.7
Microcylloepus (A)	--	--	--	--	--	0.9	--	1.7	--	0.3
Stenelmis vittipennis (A)	--	4.6	--	--	--	--	--	--	--	0.5
Optioservus (L)	--	4.4	9.6	0.7	3.5	30.0	10.0	17.1	2.0	8.6
Optioservus divergens (A)	0.5	8.3	--	3.1	--	--	4.2	4.2	--	2.3
quadrimaculatus (A)	--	2.1	4.2	--	8.4	--	2.1	2.1	--	2.1
DIP: Bezzia-Probezzia	--	4.4	--	0.4	--	0.9	--	3.5	--	1.0
Bezzia-Probezzia-Palpomyia	--	--	0.9	--	2.6	--	1.8	--	--	0.6
Palpomyia	--	--	1.1	--	3.5	--	--	--	--	0.5
Culicoides	0.2	--	--	--	--	--	--	--	--	<.1
Chironomidae	3.0	143.	22.0	5.2	206.	60.9	128.	217.	16.5	89.1
Hemerodromia	--	3.2	1.7	--	--	17.6	4.0	8.0	--	3.8
Limnophora	--	--	6.7	--	--	--	--	--	--	0.7
Simulium	0.5	9.1	2.0	--	--	2.0	--	22.0	6.1	4.6
Dicranota	--	--	1.9	--	--	1.9	--	--	3.8	0.8
Tipula	--	--	133.	--	532.	--	--	--	--	73.9
EPH: Baetidae	--	--	--	--	0.4	--	--	--	--	<.1
Baetis	0.2	0.8	0.4	--	--	--	--	--	--	0.2
Caenis	0.3	--	--	--	--	--	--	--	--	<.1
Leptophlebiidae	--	--	--	--	--	--	--	--	3.6	0.4
HEM: Ambrysus mormon (A)	--	16.8	--	--	491.	982.	--	--	--	166.
LEP: Parargyractis	--	--	--	--	--	--	3.3	16.5	--	2.2
ANI: Gomphidae	p	--	--	--	--	--	--	--	--	p
TRI: Brachycentrus	--	--	--	--	34.9	13.1	--	8.7	--	6.3
Cheumatopsyche	0.6	394.	436.	64.8	47.1	368.	371.	1926	636.	472.
Hydropsyche	0.7	422.	202.	939.	456.	939.	1478	1852	1108	822.
Hydroptila	--	26.0	--	1.4	1.9	3.6	2.0	12.5	--	5.3
Ochrotrichia	--	--	--	--	1.2	--	2.4	--	--	0.4
AMP: Hyalella azteca	--	8.2	--	--	--	--	--	--	--	0.9
OST: Ostracoda	--	--	--	--	--	--	--	p	--	p
ACA: Acari	0.1	20.6	0.5	--	0.5	1.6	0.5	0.5	1.8	2.9
OLI: Oligochaeta	8.2	--	--	0.7	--	--	1.8	--	--	1.2
GAS: Gyraulus	p	--	--	--	--	--	p	--	--	p
Physa	p	66.4	p	p	--	p	p	p	--	7.4
NEM: Nematoda	--	--	--	--	1.2	--	--	0.8	--	0.2
Totals	19.0	1140	850.	1016	1811	2439	2012	4099	1781	1686 (15,167)

Table E97. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Deer Creek near Decker and from Canyon Creek near Decker-Birney.

	Deer Creek				Canyon Creek			
	1978		1979		1979			
Taxa/Collection Date	6/10	8/15	11/05	Means	6/26	7/27	8/30	Means
COL: Agabus (L)	1.4	--	--	0.5	--	--	--	--
Agabus (A)	10.8	--	--	3.6	--	--	--	--
Dubiraphia (L)	--	--	--	--	--	--	2.2	2.7
Microcylloepus (L)	--	--	--	--	0.8	0.8	0.2	0.6
Microcylloepus (A)	--	--	--	--	--	0.8	--	0.3
Haliplus (L)	--	--	--	--	--	--	6.8	2.3
Berosus (L)	--	--	--	--	--	--	1.8	0.6
DIP: Bezzia-Probezzia	--	--	3.6	1.2	0.4	1.3	0.9	0.9
Bezzia-Probezzia-Palpomyia	--	1.2	--	0.4	--	--	--	--
Palpomyia	--	--	1.2	0.4	--	--	--	--
Chironomidae	0.2	2.9	12.0	5.0	1.6	1.1	7.6	3.4
Muscidae	--	--	--	--	--	--	6.7	2.2
Simulium (L)	0.6	0.3	--	0.3	52.7	35.1	0.8	29.5
Simulium (P)	--	--	--	--	76.6	11.2	--	29.3
Stratiomyidae	--	--	--	--	p	--	--	p
Euparyphus	--	--	--	--	6.1	67.4	48.0	40.5
Stratiomys	--	2.6	5.3	2.6	--	--	--	--
Tabanus	--	--	50.0	16.7	--	--	--	--
Tipulidae	--	--	49.8	16.6	--	--	--	--
Ormosia	--	--	100.	33.3	--	--	--	--
EPH: Baetidae	--	--	--	--	--	0.1	0.4	0.2
Baetis	--	--	--	--	1.6	--	--	0.5
Caenis	0.3	--	--	0.1	--	--	0.6	0.2
Leptophlebiidae	--	--	--	--	--	1.8	--	0.6
Tricorythodes	--	--	--	--	0.5	--	--	0.2
HEM: Heteroptera (L)	--	0.1	--	<.1	--	--	--	--
Trichocorixa (A)	--	3.2	--	1.1	--	--	--	--
ANI: Aeshna	--	8.5	--	2.8	--	--	--	--
Ophiogomphus	--	--	--	--	--	--	55.2	18.4
ZYG: Coenagrionidae	0.8	--	--	0.3	--	--	21.1	7.0
Argia	--	9.4	--	3.1	--	--	48.5	16.2
Ischnura	--	5.1	--	1.7	--	--	--	--
TRI: Cheumatopsyche	--	1.0	--	0.3	54.8	20.8	8.0	27.9
Hydropsyche	--	--	--	--	0.3	2.8	0.3	1.1
Ithytrichia	--	--	--	--	--	0.3	--	0.1
Limnephilus	84.6	--	52.8	45.8	--	--	--	--
AMP: Hyalella azteca	0.9	6.1	--	2.3	0.3	1.5	24.0	8.6
OST: Ostracoda	--	--	--	--	--	2.6	1.3	1.3
ACA: Acari	--	0.3	--	0.1	0.6	0.3	--	0.3
HIR: Hirudinea	--	--	--	--	9.6	--	--	3.2
OLI: Oligochaeta	0.4	3.5	4.2	2.7	--	--	0.8	0.3
GAS: Lymnaea	75.9	--	p	25.3	--	--	--	--
Gyraulus	4.2	--	--	1.4	--	--	--	--
Physa	19.0	42.8	p	20.6	31.6	20.2	4.7	18.8
TUR: Turbellaria	--	--	--	--	--	1.4	11.0	4.1
Totals	199.	87.0	279.	188. (565.)	238.	170.	251.	219. (659.)

Table E98. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Prairie Dog and Bull Creeks near Pyramid Butte-Birney.

	Prairie Dog Creek			Bull Creek		
Taxa/Collection Date	7/12/79	8/30/79	Means	7/12/79	8/30/79	Means
COL: Agabus (A)	13.9	--	7.0	--	--	--
Dubiraphia (L)	--	--	--	3.0	--	1.5
Dubiraphia (A)	--	--	--	0.8	--	0.4
Microcylloepus (L)	0.4	--	0.2	--	--	--
Optioservus (L)	--	1.4	0.7	--	--	--
DIP: Bezzia-Probezzia	--	--	--	--	0.4	0.2
Hemerodromia	0.7	--	0.4	1.2	0.3	0.8
Chironomidae	9.8	1.4	5.6	2.2	26.8	14.5
Simulium	1.7	0.6	1.2	10.4	0.3	5.4
EPH: Baetis	2.0	2.2	2.1	33.3	12.5	22.9
Caenis	0.6	0.6	0.6	--	--	--
Leptophlebia	--	1.4	0.7	--	--	--
Tricorythodes	--	--	--	--	1.6	0.8
HEM: Gerris remigis (A)	43.4	--	21.7	--	--	--
LEP: Parargyractis	--	--	--	--	5.0	2.5
ZYG: Argia	--	45.6	22.8	--	8.1	4.1
TRI: Brachycentrus	--	--	--	2.4	7.2	4.8
Cheumatopsyche	19.2	7.1	13.2	45.6	80.4	63.0
Hydropsyche	25.6	34.2	29.9	97.3	246.	172.
Hydroptila	8.2	20.4	14.3	--	--	--
AMP: Hyalella azteca	15.6	14.5	15.1	--	--	--
ACA: Acari	--	--	--	0.8	0.4	0.6
GAS: Gyraulus	--	--	--	--	17.0	8.5
Physa	74.8	246.	160.	--	11.8	5.9
Totals	216.	375.	296. (591.)	197.	418.	308. (615.)

Table E99. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Cook Creek near Birney-Birney Village.

Taxa/Collection Date	6/11/78	8/24/78	9/05/79	Means
COL: Agabus (L)	2.6	3.5	--	2.0
Helichus striatus (A)	--	--	9.3	3.1
Dubiraphia (L)	--	--	0.4	0.1
Dubiraphia vittata (A)	--	--	3.2	1.1
Microcylloepus (L)	--	--	0.4	0.1
Haliplus (L)	--	--	1.6	0.5
Ochthebius (L)	--	--	0.8	0.3
DIP: Bezzia-Probezzia	--	2.6	--	0.9
Palpomyia	--	1.8	--	0.6
Chironomidae	22.1	149.	26.0	65.7
Muscidae	--	20.2	--	6.7
Pericoma	--	3.3	--	1.1
Simulium	40.2	57.5	0.4	32.7
Nemotelus	--	--	5.3	1.8
Tipula	9.9	79.0	--	29.6
EPH: Baetis	--	6.8	--	2.3
Caenis	--	--	0.6	0.2
HEM: Sigara comani (A)	--	--	18.8	6.3
ZYG: Argia	--	16.2	--	5.4
TRI: Cheumatopsyche	--	147.	256.	134.
Hydropsyche	--	--	3.4	1.1
Hydroptila	--	7.6	--	2.5
AMP: Hyalella azteca	--	9.6	43.2	17.6
ACA: Acari	--	0.6	0.3	0.3
HIR: Glossiphonia complanata	--	--	75.8	25.3
OLI: Oligochaeta	2.9	20.8	1.0	8.2
GAS: Gyraulus	--	--	17.0	5.7
Physa	--	--	163.	54.3
PEL: Pisidium	--	--	12.4	4.1
NMT: Nematomorpha	18.6	--	--	6.2
Totals	96.3	526.	639.	420. (1261)

Table E100. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Logging Creek near Ashland.

Taxa/Collection Date	6/27/78	8/16/78	9/06/79	Means
COL: Listronotus (L)	4.4	--	--	1.5
Dubiraphia (L)	0.1	66.3	17.4	27.9
Dubiraphia (A)	3.8	1.1	3.1	2.7
DIP: Ceratopogonidae	0.7	--	--	0.2
Bezzia-Probezzia-Palpomyia	--	--	8.8	2.9
Chironomidae	1.8	6.8	9.4	6.0
Psychodidae	--	--	0.8	0.3
Simulium	2.1	6.4	3.2	3.9
Tabanus	--	24.8	12.4	12.4
Pseudolimnophilia	12.4	--	--	4.1
Tipula	8.9	79.0	241.	110.
EPH: Baetis	2.3	--	--	0.8
Caenis	1.8	9.2	2.8	4.6
HEM: Heteroptera (L)	0.1	--	--	<.1
MEG: Dysmicohermes	3.6	--	--	1.2
Sialidae	--	37.8	--	12.6
Sialis	3.2	--	--	1.1
ANI: Aeshna	--	8.4	4.2	4.2
ZYG: Ischnura	--	3.6	--	1.2
TRI: Cheumatopsyche	4.5	2.4	112.	39.6
Hydropsyche	--	--	3.4	1.1
Hydroptila	2.1	2.8	--	1.6
Ptilostomis	--	7.6	--	2.5
AMP: Hyalella azteca	--	--	1.0	0.3
OST: Ostracoda	--	--	1.0	0.3
ACA: Acari	0.1	0.5	1.0	0.5
HIR: Hirudinea	11.3	--	--	3.8
Glossiphonia	--	75.8	--	25.3
OLI: Oligochaeta	0.8	--	--	0.3
GAS: Gastropoda	--	--	p	p
Lymnaea	--	--	p	p
Gyraulus	--	--	p	p
Physa	--	p	80.4	26.8
Columnella	--	--	p	p
PEL: Pisidium	--	114.	57.0	57.0
NEM: Nematoda	0.1	--	0.2	0.1
Totals	64.1	447.	559.	357. (1070)

Table E101. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Beaver Creek near Brandenberg (near Ashland).

Taxa/Collection Date	7/13/78	9/03/78	10/09/78	7/12/79	8/24/79	Means
COL: Dubiraphia (L)	--	--	3.1	0.4	1.5	1.0
Microcylloepus pusillus (A)	--	0.9	--	--	--	0.2
Haliplus (L)	--	--	--	--	37.7	7.5
Haliplus (A)	--	--	--	2.4	9.6	2.4
DIP: Bezzia-Probezzia	--	0.9	0.9	--	--	0.4
Bezzia-Probezzia-Palpomyia	--	--	--	0.9	--	0.2
Chironomidae	9.5	26.5	14.4	23.8	29.3	20.7
Clinocera-Chelifera	0.2	--	--	--	--	<.1
Hemerodromia	0.5	1.4	--	--	--	0.4
Muscidae	--	--	--	3.4	--	0.7
Simulium	7.2	4.0	1.3	5.6	6.7	5.0
EPH: Caenis	--	1.6	42.8	--	23.0	13.5
Tricorythodes	0.3	--	--	--	--	0.1
HEM: Ambrysus mormon (A)	--	3.6	0.6	--	--	0.8
ANI: Leucorrhinia	--	--	--	--	33.8	6.8
ZYG: Coenagrionidae	--	--	--	--	14.8	2.8
Ischnura	--	36.1	6.0	--	--	8.4
TRI: Cheumatopsyche	178.	1714	1331	183.	--	681.
Hydropsyche	5.1	--	6.8	--	--	2.4
Hydroptila	1.8	--	--	2.4	3.6	1.6
AMP: Hyalella azteca	--	39.2	29.8	175.	65.1	61.8
ACA: Acari	--	2.5	--	1.0	--	0.7
HIR: Erpobdellidae	0.1	--	--	3.6	--	0.7
Dina anoculata	--	--	--	--	11.8	2.4
Erpobdella	--	--	--	22.8	--	4.6
Batracobdella	--	--	--	31.2	--	6.2
Glossiphonia complanata	--	8.4	--	614.	614.	247.
Helobdella stagnalis	--	--	503.	83.8	137.	145.
Placobdella	19.0	--	38.0	--	--	11.4
Percymoorensis marmoratis	--	--	2.6	5.2	--	1.6
OLI: Oligochaeta	--	--	--	3.9	--	0.8
GAS: Gyraulus	--	--	--	p	--	p
Physa	--	66.2	--	66.2	33.1	33.1
Totals	222.	1905	1980	1229	1020	1271 (6356)

Table E102. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Hanging Woman Creek near Quietus-Decker during the 1978 sampling season.

Taxa-Collection Date	6/16	6/28	7/18	8/15	8/28	9/05	10/07	11/04
COL: Dubiraphia (L)	--	--	--	--	--	--	--	0.4
Dubiraphia (A)	--	--	--	--	--	--	0.4	--
Dubiraphia vittata (A)	--	--	--	--	--	--	--	--
Microcylloepus (L)	0.1	--	--	0.2	--	--	0.3	--
Microcylloepus (A)	--	--	--	--	--	--	5.2	5.5
Microcylloepus pusillus (A)	--	--	--	--	6.6	--	--	--
Stenelmis (L)	--	--	--	0.4	--	--	--	--
Hyperodes (L)	--	--	--	--	--	--	--	--
DIP: Bezzia-Probezzia	--	--	0.7	0.2	--	--	0.4	0.2
Palpomyia	--	--	--	--	--	0.4	--	--
Chironomidae	1.2	9.7	14.7	4.0	12.3	9.2	2.7	0.9
Empididae	--	--	--	--	--	--	0.3	--
Hemerodromia	--	--	--	--	1.1	--	--	--
Limnophora	--	--	--	--	--	--	--	1.7
Simulium (L)	224.	1.4	--	0.7	51.6	14.1	27.4	131.
Simulium (P)	155.	--	--	--	--	--	--	--
Tabanus	--	--	--	--	--	76.4	--	38.2
EPH: Baetis	--	--	--	--	--	0.3	--	--
Caenis	--	0.5	4.5	--	--	0.7	--	--
Ephemerellidae	--	--	--	--	--	--	--	--
Choroterpes-Leptophlebia	--	--	--	--	--	--	--	--
HEM: Sigara trillineata (A)	--	--	--	--	--	--	--	--
Ambrysus mormon (A)	--	--	--	--	6.1	--	--	--
MEG: Sialis	--	--	--	--	--	2.5	--	--
ODO: Odonata	--	9.7	--	--	--	--	--	--
ZYG: Hetaerina	--	--	--	--	--	--	--	--
Hetaerina americana	--	--	--	--	--	--	9.3	--
Coenagrionidae	--	--	--	--	--	--	--	--
Ischnura	--	--	--	--	--	--	3.0	--
TRI: Brachycentridae	--	--	0.2	--	--	--	--	--
Cheumatopsyche	1.7	--	24.9	104.	264.	2.6	171.	566.
Hydropsyche	--	--	--	5.9	16.2	0.5	28.0	22.3
Hydroptila	--	--	--	--	--	--	0.4	--
Ithytrichia	--	1.9	--	1.8	1.0	--	--	--
Limnephilus	--	--	--	--	--	--	--	--
Polycentropus	--	0.8	4.2	--	--	--	--	--
AMP: Hyalella azteca	--	--	--	--	--	0.5	1.5	--
OLI: Oligochaeta	2.5	0.6	--	--	6.8	2.5	14.6	1.7
GAS: Gastropoda	--	--	--	--	--	--	--	--
Gyraulus	--	--	--	--	--	--	--	--
Physa	1.3	--	--	11.1	11.1	41.8	169.	60.6
TUR: Turbellaria	0.5	--	--	--	--	--	--	--
NMT: Nematomorpha	--	18.6	--	--	--	--	--	--
Totals	386.	43.2	49.2	128.	377.	152.	434.	829.

Table E103. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Upper Hanging Woman Creek near Quietus-Decker during the 1979 sampling season.

Taxa/Collection Date	5/19	6/21	7/27	8/17	9/04	9/14	Two-Year Means
COL: Dubiraphia (L)	--	0.5	1.3	--	1.6	0.5	0.3
Dubiraphia (A)	--	--	1.4	--	0.7	--	0.2
Dubiraphia vittata (A)	--	--	--	--	--	0.4	<.1
Microcylloepus (L)	0.1	--	0.2	--	0.2	0.2	0.1
Microcylloepus (A)	1.1	--	0.2	--	--	--	0.9
Microcylloepus pusillus (A)	--	--	--	--	--	--	0.5
Stenelmis (L)	--	--	--	--	--	--	<.1
Hyperodes (L)	--	--	--	8.8	--	--	0.6
DIP: Bezzia-Probezzia	--	--	--	--	--	0.2	0.1
Palpomyia	--	--	--	--	--	--	<.1
Chironomidae	7.6	1.9	6.9	14.2	3.9	1.0	6.4
Empididae	0.3	--	--	--	--	--	<.1
Hemerodromia	--	--	--	--	--	--	0.1
Limnophora	--	--	--	6.7	--	--	0.6
Simulium (L)	5.3	0.1	1.8	272.	1.1	0.3	52.2
Simulium (P)	--	--	--	--	--	--	11.1
Tabanus	--	--	--	--	--	--	8.2
EPH: Baetis	--	--	--	--	--	--	<.1
Caenis	--	0.6	0.6	--	--	--	0.5
Ephemerellidae	--	--	0.4	--	--	--	<.1
Choroterpes-Leptophlebia	--	--	--	--	1.2	--	0.1
HEM: Sigara trillineata (A)	--	--	2.4	--	--	--	0.2
Ambrysus mormon (A)	--	6.2	37.2	12.4	--	6.2	4.9
MEG: Sialis	--	--	--	--	--	--	0.2
ODO: Odonata	--	--	--	--	--	--	0.7
ZYG: Hetaerina	--	--	--	--	45.6	6.9	3.8
Hetaerina americana	--	--	4.7	--	--	--	1.0
Coenagrionidae	--	--	--	--	7.0	7.0	1.0
Ischnura	--	--	--	--	--	--	0.2
TRI: Brachycentridae	--	--	--	--	--	--	<.1
Cheumatopsyche	671.	51.1	5.3	223.	23.1	18.3	152.
Hydropsyche	113.	2.7	3.7	43.8	6.8	0.9	17.4
Hydroptila	1.1	--	0.4	--	--	--	0.1
Ithytrichia	--	0.3	0.3	1.9	2.2	0.3	0.7
Limnephilus	4.4	--	--	--	--	--	0.3
Polycentropus	--	--	0.5	--	--	--	0.4
AMP: Hyalella azteca	--	--	0.7	2.1	1.6	1.4	0.6
OLI: Oligochaeta	--	0.4	--	0.8	--	0.8	2.2
GAS: Gastropoda	--	--	--	--	--	p	p
Gyraulus	--	p	--	--	47.2	p	3.4
Physa	--	8.8	6.9	53.0	312.	201.	62.6
TUR: Turbellaria	--	--	--	--	--	0.5	0.1
NMT: Nematomorpha	--	--	--	--	--	--	1.3
Totals	804.	72.6	74.9	639.	454.	246.	335. (4689)

Table E104. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from lower Hanging Woman Creek near Birney during the 1978 sampling season (the first page of two pages).

Taxa/Collection Date	6/16	6/29	7/19	8/15	9/05	10/07	11/04
COL: Carabidae (L)	--	--	--	1.0	--	--	--
Curculionidae (L)	--	--	--	--	--	--	--
Agabus (L)	--	--	--	--	--	--	--
Elmidae (L)	0.2	--	--	--	--	--	--
Dubiraphia (L)	0.4	--	--	--	--	--	0.8
Dubiraphia (A)	--	--	--	--	--	--	--
Microcylloepus (L)	0.2	0.2	--	--	--	--	5.2
Microcylloepus (A)	--	--	--	--	--	--	14.0
Microcylloepus pusillus (A)	--	0.4	--	--	--	--	--
Stenelmis (L)	--	--	3.2	--	--	--	--
DIP: Ceratopogonidae	0.2	--	--	--	--	--	--
Bezzia-Probezzia	0.1	0.2	--	--	--	--	0.9
Palpomyia	0.2	--	--	--	--	--	--
Chironomidae	1.3	18.0	2.2	2.3	4.0	1.2	18.6
Dolichopodidae	--	--	--	--	--	--	--
Empididae	--	--	--	--	--	0.3	--
Hemerodromia	--	--	--	--	--	--	1.4
Simulium (L)	0.2	106.	18.7	29.8	42.6	123.	462.
Simulium (P)	--	--	--	--	45.8	--	--
Dicranota	--	--	1.0	--	--	--	--
EPH: Baetis	--	--	--	--	--	--	--
Caenis	5.1	0.2	--	--	--	--	--
Heptageniidae	--	--	0.2	--	--	--	--
Choroterpes	--	--	--	--	--	--	--
HEM: Ambrysus mormon (A)	--	--	--	--	--	--	--
LEP: Parargyractis	--	--	--	--	--	--	--
MEG: Sialis	2.5	--	--	--	--	--	--

Table E104. Continued (the second page of two pages).

Taxa/Collection Date	6/16	6/29	7/19	8/15	9/05	10/07	11/04
ZYG:Zygoptera	--	--	--	--	--	--	--
Hetaerina	--	--	--	--	--	--	--
Ischnura	--	--	--	--	--	--	--
TRI:Cheumatopsyche	1.9	264.	111.	113.	9.5	131.	904.
Hydropsyche	--	12.7	92.8	88.2	22.9	73.1	297.
Hydroptila	--	--	--	--	--	--	--
Ithytrichia	0.2	--	--	--	--	--	--
Polycentropus	--	--	--	--	--	--	--
AMP:Hyalella azteca	--	--	--	--	--	--	--
OST:Ostracoda	--	--	--	--	--	--	1.9
ACA:Acari	--	--	--	--	--	--	--
OLI:Oligochaeta	1.2	--	--	--	--	--	--
GAS:Gastropoda	--	--	--	--	--	--	--
Ferrissia	--	--	--	--	--	--	--
Lymnaea	5.4	--	--	--	--	--	--
Gyraulus	4.2	--	--	--	--	--	--
Physa	--	--	5.9	--	--	47.3	47.3
PEL:Pelecypoda	--	--	--	--	--	--	--
Pisidium	--	--	--	--	--	--	--
Sphaerium	8.8	--	--	--	p	--	--
Unionidae	6.8	--	--	--	--	--	--
NEM:Nematoda	--	--	--	--	--	--	2.0
NMT:Nematomorpha	--	--	--	--	--	--	--
Totals	38.9	402.	235.	233.	125.	376.	1755

Table E105. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from lower Hanging Woman Creek near Birney during the 1979 sampling season (the first page of two pages).

Taxa/Collection Date	2/11	3/31	5/19	6/22	7/28	8/18	9/14a	9/14b	9/15c	Two-Year Means
COL:Carabidae (L)	--	--	--	--	--	--	--	--	--	0.1
Curculionidae (L)	--	--	4.4	--	--	--	--	--	--	0.3
Agabus (L)	--	--	1.2	--	--	--	--	--	--	0.1
Elmidae (L)	--	--	p	--	--	--	--	--	--	<.1
Dubiraphia (L)	--	0.1	--	--	0.1	--	--	--	1.8	0.2
Dubiraphia (A)	--	--	--	--	--	--	--	--	6.0	0.4
Microcylloepus (L)	1.7	0.3	--	--	5.8	0.6	--	1.7	4.6	1.3
Microcylloepus (A)	--	--	--	--	3.2	--	--	--	2.0	1.2
Microcylloepus pusillus (A)	--	2.4	--	--	--	--	--	--	--	0.2
Stenelmis (L)	1.3	--	--	--	1.3	--	--	1.9	--	0.5
DIP:Ceratopogonidae	--	--	--	--	--	--	--	--	--	<.1
Bezzia-Probezzia	--	--	0.2	--	0.4	--	2.6	0.2	0.4	0.3
Palpomyia	--	--	--	--	--	--	--	--	--	<.1
Chironomidae	14.0	40.1	23.9	8.8	25.2	13.1	9.6	17.4	5.6	12.8
Dolichopodidae	--	--	0.2	--	--	--	--	--	--	<.1
Empididae	--	--	--	--	2.4	--	--	--	--	0.2
Hemerodromia	1.4	--	--	--	--	0.2	1.6	1.1	0.2	0.4
Simulium (L)	145.	73.0	141.	49.0	32.0	171.	413.	120.	4.7	121.
Simulium (P)	--	--	--	--	--	51.8	--	--	--	6.1
Dicranota	--	--	--	--	5.7	--	--	--	--	0.4
EPH:Baetis	--	0.6	--	--	--	0.3	--	--	1.4	0.1
Caenis	--	--	52.0	--	--	--	--	--	--	3.6
Heptageniidae	--	--	--	--	--	--	--	--	--	<.1
Choroterpes	--	0.7	--	--	--	--	--	--	--	<.1
HEM:Ambrysus mormon (A)	--	--	--	--	28.9	--	--	--	231.	16.2
LEP:Parargyractis	--	0.8	--	--	--	--	--	0.8	4.6	0.4
MEG:Sialis	--	3.2	--	--	--	--	--	3.2	12.8	1.4

a--Upstream and intermediate sampling site.
b--Major downstream sampling site.
c--Sampling site near mouth.

Table E105. Continued (the second page of two pages).

Taxa/Collection Date	2/11	3/31	5/19	6/22	7/28	8/18	9/14a	9/14b	9/15c	Two-Year Means
ZYG:Zygoptera	--	--	--	--	8.2	--	--	--	--	0.5
Hetaerina	9.3	--	--	--	--	--	--	--	--	0.6
Ischnura	--	--	--	--	--	--	--	--	28.2	1.8
TRI:Cheumatopsyche	146.	343.	1.8	12.0	599.	94.2	51.2	243.	131.	197.
Hydropsyche	145.	88.9	--	5.4	273.	51.0	22.8	52.9	52.8	79.9
Hydroptila	0.7	--	--	0.4	1.5	5.9	--	0.7	--	0.6
Ithytrichia	--	--	--	0.8	0.3	0.6	--	--	--	0.1
Polycentropus	--	--	--	--	--	--	--	0.5	--	<.1
AMP:Hyalella azteca	--	--	--	0.5	--	--	--	--	--	<.1
OST:Ostracoda	--	--	--	--	--	--	--	--	--	0.1
ACA:Acari	--	--	--	--	0.6	--	--	--	--	<.1
OLI:Oligochaeta	--	--	--	0.8	--	--	--	0.4	--	0.2
GAS:Gastropoda	--	--	--	--	--	--	p	--	--	p
Ferrissia	--	--	--	--	--	--	--	--	8.9	0.6
Lymnaea	--	--	--	--	--	--	--	--	--	0.3
Gyraulus	--	--	--	--	--	--	--	--	--	0.3
Physa	--	21.6	8.6	8.6	--	--	17.3	8.6	251.	26.0
PEL:Pelecypoda	--	p	--	--	--	--	--	--	--	p
Pisidium	--	--	--	--	--	--	--	--	4.6	0.3
Sphaerium	--	--	--	--	--	--	--	--	--	0.6
Unionidae	--	--	--	--	--	--	--	--	--	0.4
NEM:Nematoda	--	--	--	--	--	--	--	--	--	0.1
NMT:Nematomorpha	--	--	--	--	74.5	--	--	--	--	4.7
Totals	464.	575.	233.	86.3	1062	389.	518.	452.	752.	481. (7696)

a--Upstream and intermediate sampling site.
b--Major downstream sampling site.
c--Sampling site near mouth.

Table E106. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from the East Fork of Hanging Woman near Birney (the first page of two pages).

	1978 Samples				1979 Samples							
Taxa/Collection Date	6/11	8/18	10/8	11/04	2/11	3/31	5/19	6/22	7/28	8/20	9/05	Means
COL: Curculionidae (L)	--	--	--	8.8	--	--	--	--	--	--	--	0.8
Helichus striatus (A)	--	--	4.7	--	--	--	4.7	--	--	--	--	0.9
Agabus (L)	1.2	--	--	--	--	--	--	--	--	--	--	0.1
Dubiraphia (L)	--	--	--	--	0.8	--	0.3	--	--	--	--	0.1
Dubiraphia (A)	--	--	--	--	--	--	0.8	--	--	--	--	0.1
Microcylloepus (L)	--	--	--	--	--	--	--	--	--	0.2	--	<.1
Optioservus (L)	--	--	0.7	--	--	--	--	--	--	--	--	0.1
Stenelmis (L)	0.6	--	--	--	--	--	--	--	--	--	--	0.1
DIP: Bezzia-Probezzia	--	0.2	--	0.7	1.0	--	0.6	0.6	--	--	--	0.3
Bezzia-Probezzia-Palpomyia	--	--	--	--	--	0.4	--	--	--	--	--	<.1
Chironomidae	2.3	0.3	1.1	2.1	0.5	6.2	3.3	--	1.0	0.1	0.2	1.6
Dixa	--	0.1	--	--	--	--	--	--	--	--	--	<.1
Dolichopodidae	--	--	--	--	--	--	--	--	0.2	--	--	<.1
Clinocera-Chelifera	--	--	--	0.2	0.2	--	0.2	--	--	--	--	0.1
Hemerodromia	--	--	--	--	--	--	0.2	--	--	--	--	<.1
Muscidae	--	--	--	4.5	--	--	--	--	4.5	--	--	0.8
Pericoma	--	--	--	2.0	5.0	--	--	--	--	--	--	0.6
Simulium (L)	87.9	7.4	3.1	1.6	1.2	0.7	0.6	--	52.8	47.1	74.5	25.2
Simulium (P)	--	--	--	--	--	3.2	--	p	--	--	4.9	0.7
Stratiomyidae	--	--	--	--	--	2.1	--	--	--	--	--	0.2
Euparyphus	14.7	--	--	--	--	--	2.1	--	2.1	--	--	1.7
Tabanus	--	--	--	--	--	--	--	--	12.5	--	--	1.1
Dicranota	--	3.9	0.3	--	1.1	--	0.6	--	12.0	9.9	--	2.5
Tipula	302.	10.4	14.2	59.8	127.	36.6	240.	--	--	--	--	71.8
EPH: Baetidae	--	--	--	0.1	--	--	--	--	--	--	--	<.1
Baetis	68.4	1.7	2.5	--	10.4	9.6	60.6	--	3.7	6.6	13.9	16.1
MEG: Sialis	--	--	--	1.8	--	--	--	--	--	--	--	0.2

Table E106. Continued (the second page of two pages).

Taxa/Collection Date	1978 Samples 6/11	8/18	10/8	11/04	1979 Samples 2/11	3/31	5/19	6/22	7/28	8/20	9/05	Means
ODO: Odonata	--	--	9.7	--	--	--	--	--	--	--	--	0.9
ZYG: Argia	--	--	9.1	--	--	--	--	--	--	--	--	0.8
Argia vivida	--	9.1	--	--	--	--	--	--	--	--	--	0.8
Ischnura	3.0	--	--	--	--	--	--	--	--	--	--	0.3
TRI: Helicopsyche	--	--	--	--	--	p	--	--	--	--	--	p
Cheumatopsyche	63.6	--	2.0	191.	82.9	20.5	83.2	1.6	--	6.5	1.3	41.1
Hydropsyche	--	--	3.1	15.4	12.7	1.1	353.	--	--	3.1	--	35.3
Hydroptila (L)	--	--	--	0.4	--	--	--	--	--	--	--	<.1
Hydroptila (P)	--	--	--	--	--	--	--	p	--	--	--	p
Ochrotricha	--	--	--	--	--	--	--	--	--	--	0.4	<.1
Hesperophylax (L)	7.5	18.7	392.	72.0	8.1	20.3	--	--	27.6	265.	25.9	76.1
Hesperophylax (P)	--	7.5	--	--	--	--	--	p	--	--	--	0.7
Polycentropus	--	--	--	0.5	--	--	--	--	--	--	--	<.1
AMP: Hyalella azteca	1.6	--	--	3.2	--	--	--	--	--	--	--	0.4
ACA: Acari	--	--	0.8	0.2	--	--	0.1	--	0.3	--	0.2	0.1
HIR: Hirudinea	--	--	9.5	--	9.5	--	--	--	--	--	--	1.7
Glossiphonia complanata	--	3.6	--	--	--	--	--	--	--	--	--	0.3
OLI: Oligochaeta	--	0.2	0.5	0.6	1.0	14.5	0.6	--	0.3	--	0.2	1.6
GAS: Lymnaea	16.2	--	--	16.2	--	--	--	--	--	--	--	2.9
Physa	4.2	9.6	p	24.2	p	4.2	4.2	4.2	--	--	--	4.6
Columnella	--	--	--	--	--	--	p	--	--	--	--	p
PEL: Pisidium	2.1	2.1	2.1	10.5	14.7	--	--	--	--	--	--	2.9
Sphaerium	--	--	--	--	--	--	--	p	--	--	--	p
NMT: Nematomorpha	--	--	--	--	--	--	--	--	0.2	--	--	<.1
Totals	575.	74.8	455.	416.	276.	119.	755.	6.4	117.	339.	122.	296. (3255)

Table E107. Biomass (milligrams dry weight per square foot of benthic macroinvertebrates collected with a Surber sampler from Bear Creek near Otter.

Taxa/Collection Date	7/12/79	8/23/79	9/30/79	Means
COL: Agabus (L)	1.4	--	2.4	1.3
Rhantus (L)	--	1.2	--	0.4
Haliplus (A)	--	1.2	--	0.4
Hydrophilidae (L)	1.0	--	--	0.3
Enochrus (L)	0.6	--	--	0.2
Helophorus (A)	1.0	--	--	0.3
Laccobius (L)	--	0.5	--	0.2
Laccobius (A)	2.4	--	--	0.8
DIP: Bezzia-Probezzia	--	--	0.4	0.1
Chironomidae	24.1	4.0	29.2	19.1
Hererodromia	--	--	0.3	0.1
Muscidae	13.6	--	15.5	9.7
Limnophora	--	40.4	--	13.5
Simulium (L)	1.9	17.5	64.7	28.0
Simulium (P)	--	--	21.5	7.2
Euparyphus	--	2.4	--	0.8
Stratiomys	--	2.6	--	0.9
Tabanus	--	16.7	--	5.6
ZYG: Coenagrionidae	--	--	7.0	2.3
TRI: Cheumatopsyche	2.2	0.9	26.2	9.8
Hydroptila	19.0	--	0.9	6.6
Ithytrichia	--	--	0.3	0.1
AMP: Hyallela azteca	2.0	1.5	40.6	14.7
OST: Ostracoda	1.0	--	--	0.3
OLI: Oligochaeta	1.0	--	2.2	1.1
GAS: Lymnaea	69.4	p	--	23.1
Gyraulus	6.8	--	--	2.3
Physa	20.5	4.7	97.4	40.9
Totals	168.	93.6	309.	190. (571.)

Table E108. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from upper Otter Creek near Otter-Fort Howe.

	1978 Samples		1979 Samples					
Taxa/Collection Date	7/07	8/29	6/27	7/31	8/31	9/30a	9/30b	Means
COL: Listronotus (A)	--	--	17.6	--	--	--	--	2.5
Agabus (L)	--	--	12.0	--	--	--	--	1.7
Deronectes (A)	--	--	--	--	16.0	--	--	2.3
Dubiraphia (L)	2.8	--	--	--	3.8	--	0.8	1.1
Dubiraphia (A)	--	--	4.4	0.6	1.4	--	--	0.9
Microcylloepus (L)	0.2	--	--	--	--	--	0.1	<.1
Microcylloepus (A)	--	--	--	--	--	--	0.9	0.1
Haliplus (L)	--	--	--	0.8	--	--	--	0.1
DIP: Bezzia	0.6	--	--	--	--	--	--	0.1
Bezzia-Probezzia	1.0	--	4.0	--	0.8	0.1	0.7	0.9
Palpomyia	--	--	--	--	--	0.4	--	0.1
Chironomidae	68.4	49.7	204.	8.4	69.1	1.5	23.0	60.6
Hemerodromia	--	--	--	--	--	--	0.7	0.1
Muscidae	--	13.6	--	--	8.4	--	6.0	4.0
Limnophora	--	--	67.7	--	--	--	--	9.7
Simulium (L)	1.0	279.	101.	47.0	2864	0.3	134.	489.
Simulium (P)	--	301.	--	--	--	--	--	43.0
Chrysops	--	5.6	--	--	22.4	--	--	4.0
Dicranota	--	--	11.2	--	--	--	--	1.6
EPH: Baetis	--	--	1.0	--	--	--	--	0.1
Caenis	3.3	1.5	--	0.8	1.5	--	14.0	3.0
HEM: Ambrysus mormon (A)	3.6	--	--	--	--	--	--	0.5
MEG: Sialis	1.5	--	--	--	--	--	--	0.2
ZYG: Argia	--	--	--	--	--	21.3	9.5	4.4
Ischnura	--	--	--	11.0	110.	--	110.	33.0
TRI: Cheumatopsyche	0.3	32.8	30.8	44.0	381.	19.2	625.	162.
Hydropsyche	--	--	--	2.2	--	--	--	0.3
Hydroptila	5.8	82.0	28.0	3.0	9.0	--	2.8	18.7
Ithytrichia	1.0	--	--	--	--	--	--	0.1
Neureclipsis	3.3	--	--	--	--	--	--	0.5
Polycentropus	0.5	--	--	--	--	--	--	0.1
AMP: Hyalella azteca	7.9	18.4	--	21.6	242.	5.1	76.7	53.1
ACA: Acari	--	0.8	--	0.4	0.8	--	--	0.3
HIR: Hirudinea	11.3	--	--	--	--	--	--	1.6
Glossiphoniidae	--	--	--	13.0	--	--	--	1.9
Glossiphonia complanata	--	--	--	--	--	--	25.3	3.6
Helobdella stagnalis	--	--	--	--	12.8	--	--	1.8
OLI: Oligochaeta	--	--	--	7.8	12.4	1.6	--	3.1
GAS: Gyraulus	--	--	p	69.8	14.0	--	14.0	14.0
Helisoma	21.9	--	--	--	--	--	--	3.1
Physa	--	--	--	26.6	88.8	44.0	174.	47.6
PEL: Pisidium	7.2	--	28.8	--	--	--	28.8	9.3
Totals	142.	784.	511.	257.	3858	93.5	1246	984. (6892)

a--Upstream sampling site above Bear Creek.
b--Major upstream sampling site.

Table E109. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Cow Creek near Otter-Fort Howe.

Taxa/Collection Date	7/31/79	8/31/79	Means
COL: Helichus striatus (A)	--	4.7	2.4
Optioservus (L)	24.3	15.4	19.9
Optioservus (A)	25.9	1.3	13.6
Optioservus divergens (A)	--	7.7	3.9
Optioservus quadrimaculatus (A)	--	7.0	3.5
Agabus (L)	1.2	--	0.6
Agabus (A)	87.4	--	43.7
DIP: Chironomidae	1.6	0.5	1.1
Simulium (L)	5.1	2.3	3.7
Simulium (P)	--	11.6	5.8
Nemotelus	--	2.6	1.3
Dicranota	5.7	--	2.9
EPH: Baetis	6.5	7.7	7.1
HEM: Gerris remigis (A)	16.2	--	8.1
ZYG: Argia	--	3.7	1.9
PLE: Nemouridae	--	4.8	2.4
Nemoura	8.0	5.6	6.8
TRI: Cheumatopsyche	--	2.0	1.0
Hesperophylax	25.1	52.2	38.7
Psychoglypha	2.8	--	1.4
AMP: Hyalella azteca	1.0	1.0	1.0
ACA: Acari	--	0.3	0.2
OLI: Oligochaeta	--	0.4	0.2
PEL: Pisidium	--	6.2	3.1
NMI: Nematomorpha	--	65.9	33.0
Totals	211.	203.	207. (414.)

Table E110. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from lower Otter Creek near Ashland (the first page of two pages).

	1978 Samples							1979 Samples								
Taxa/Collection Date	6/15	7/05	7/21	7/31	9/04	10/08	11/05	2/11	3/31	5/20	6/20	7/28	8/18	9/30a	9/30b	Means
COL:Donacia (L)	--	--	--	--	--	--	--	0.3	--	--	--	--	--	--	--	<.1
Dubiraphia (L)	--	--	--	--	--	--	--	--	0.1	0.1	--	--	--	--	--	<.1
Dubiraphia (A)	--	--	--	--	--	--	--	--	0.4	--	--	--	--	--	--	<.1
Microcylloepus (L)	--	--	--	--	--	1.3	0.7	45.2	2.7	--	1.2	0.9	8.5	29.2	5.0	6.3
Microcylloepus (A)	--	--	0.7	0.2	--	--	0.7	0.4	--	--	0.1	0.3	6.6	1.4	0.9	0.8
Microcylloepus pusillus (A)	--	0.2	--	--	--	--	--	--	--	--	--	--	--	--	--	<.1
Stenelmis (L)	--	--	--	4.4	12.4	0.5	--	--	1.3	--	--	--	32.0	--	2.5	3.5
Stenelmis (A)	--	--	--	--	14.8	--	--	--	--	--	1.2	--	--	--	--	1.1
Stenelmis sinuata-humerosa (A)	--	--	--	--	--	--	--	--	--	--	--	1.1	--	--	--	0.1
Hydraenidae (L)	--	--	--	0.4	--	--	--	--	--	--	--	--	--	--	--	<.1
Laccobius (L)	--	--	--	--	--	--	--	--	--	--	--	0.5	--	--	--	<.1
DIP:Bezzia-Probezzia	--	--	1.6	--	--	--	--	--	2.0	0.9	--	--	--	4.9	--	0.6
Chironomidae	0.1	6.3	73.9	50.1	64.1	11.1	7.8	42.5	0.6	9.0	63.5	27.0	307.	52.7	29.1	49.7
Clinocera-Chelifera	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.7	<.1
Hemerodromia	--	--	--	--	1.0	0.5	--	--	--	--	--	0.5	2.7	0.3	2.1	0.5
Simulium (L)	--	3.2	196.	6.0	133.	1.1	69.8	--	0.3	0.9	3.1	5.2	76.0	3.2	469.	64.5
Simulium (P)	--	--	--	--	--	--	--	--	--	--	--	--	38.0	--	--	2.5
Euparyphus	--	--	--	--	--	--	--	--	6.4	--	--	--	--	--	--	0.4
Nemotelus	--	--	--	--	--	--	--	--	--	--	--	--	--	0.7	--	<.1
Chrysops	--	--	--	--	--	--	--	--	9.4	--	--	--	--	--	--	0.6
EPH:Baetis	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5	--	<.1
Caenis	0.3	0.3	3.6	0.3	2.4	0.3	--	1.8	0.6	--	--	--	1.4	3.6	--	1.0
Tricorythodes	--	--	--	--	--	0.3	--	--	--	--	--	--	--	--	3.6	0.3
HEM:Corixidae (L)	3.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.2
Ambrysus mormon (A)	--	9.8	78.4	--	--	--	--	31.2	31.2	--	--	--	62.4	31.2	--	16.3
LEP:Parargyractis	--	--	--	--	--	1.0	--	--	--	--	--	--	4.0	--	--	0.3

a--Upstream and intermediate sampling site.
b--Major downstream sampling site.

Table E110. Continued (the second page of two pages).

Taxa/Collection Date	1978 Samples 6/15	7/05	7/21	7/31	9/04	10/08	11/05	1979 Samples 2/11	3/31	5/20	6/20	7/28	8/18	9/30a	9/30b	Means
ZYG: Hetaerina	--	--	--	--	--	--	--	--	--	--	--	--	--	--	84.8	5.7
Hetaerina americana	--	--	--	--	--	8.3	--	--	--	--	--	--	--	--	--	0.6
Ischnura	--	--	--	--	--	--	--	--	--	--	--	--	--	4.7	--	0.3
TRI: Brachycentrus	--	--	--	--	34.9	--	--	--	--	--	--	--	--	--	--	2.3
Cheumatopsyche	--	9.4	65.8	85.9	58.0	87.9	124.	81.3	26.5	29.2	177.	53.4	533.	495.	434.	151.
Hydropsyche	--	5.1	--	11.7	28.6	12.4	44.3	18.8	--	5.9	1.3	9.0	305.	--	47.6	32.6
Hydroptila	--	0.6	34.7	19.0	6.8	32.8	2.5	2.4	1.6	--	26.5	4.1	13.0	7.6	6.1	10.5
Ithytrichia	--	--	0.5	0.8	1.6	--	--	--	--	--	6.0	0.5	1.6	0.5	--	0.8
Ochrotrichia	--	--	--	--	--	--	--	--	--	--	--	--	5.6	--	--	0.4
Limnephilidae	--	--	--	--	--	--	--	--	0.4	--	--	--	--	--	--	<.1
AMP: Hyalella azteca	--	--	--	--	--	--	--	--	3.9	--	--	--	--	--	--	0.3
ACA: Acari	--	--	--	--	--	--	--	--	0.2	--	--	--	0.8	--	--	0.1
HIR: Hirudinea	--	--	--	--	--	--	--	3.2	1.6	--	1.6	--	--	--	--	0.4
Glossiphonia complanata	--	--	--	--	--	--	--	--	--	--	--	--	--	62.4	--	4.2
Hebobdella stagnalis	--	--	--	--	--	--	--	--	--	--	--	--	--	14.6	--	1.0
OLI: Oligochaeta	--	0.4	--	--	--	0.8	1.6	0.8	3.1	1.2	0.8	--	--	--	--	0.6
GAS: Gyraulus	--	--	--	--	--	--	--	--	--	--	--	p	--	96.0	--	6.4
Helisoma	--	--	--	--	--	--	--	--	--	--	--	--	--	33.7	--	2.2
Physidae	--	--	--	--	--	--	--	--	--	--	--	--	23.7	--	--	1.6
Physa	--	--	--	--	--	p	--	2.6	7.9	--	--	4.0	--	112.	--	8.4
PEL: Pelecypoda	--	p	--	--	--	--	--	--	--	--	--	--	--	--	--	p
NEM: Nematoda	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	<.1
NMT: Nematomorpha	--	--	--	--	--	--	--	--	37.3	--	--	--	--	--	--	2.5
Totals	3.7	35.3	455.	179.	358.	158.	251.	231.	138.	47.2	282.	107.	1421	954.	1085	381. (5705)

a--Upstream and intermediate sampling site.
b--Major downstream sampling site.

Table E111. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Pumpkin Creek near Miles City.

Taxa/Collection Date	6/15/78	7/05/78	7/21/78	7/31/78	9/06/78	10/09/78	5/12/79	8/09/79	Means
COL: Dubiraphia (A)	--	0.4	--	--	--	--	--	--	<.1
Microcylloepus (A)	--	--	--	--	3.5	--	--	--	0.4
Stenelmis vittipennis (A)	--	--	--	1.4	--	--	--	--	0.2
Ochthebius (A)	--	--	--	--	--	--	--	1.1	0.1
Laccobius (L)	--	1.0	--	--	--	--	--	--	0.1
DIP: Bezzia-Probezzia	--	--	88.5	0.7	--	--	--	0.7	11.2
Chironomidae	0.1	0.2	0.3	1.5	20.1	20.5	0.6	14.6	7.2
Hemerodromia	--	--	--	0.2	3.4	0.7	--	0.2	0.6
Simulium	--	1.4	0.2	0.9	30.9	9.1	0.6	0.6	5.5
EPH: Baetis	--	--	--	--	6.2	0.1	--	--	0.8
Caenis	--	1.2	1.2	1.4	--	--	18.0	1.4	2.9
HEM: Corixidae (L)	0.7	--	--	--	--	--	--	--	0.1
Sigara (A)	--	--	--	--	--	--	--	2.4	0.3
TRI: Cheumatopsyche	--	1.4	1.4	9.3	1663	871.	1.1	4.4	319.
Hydropsyche	--	2.5	2.0	3.4	442.	224.	1.7	--	84.5
Hydroptila	--	--	--	0.3	--	--	--	0.7	0.1
Ithytrichia	--	--	--	1.0	0.5	--	--	1.6	0.4
AMP: Hyalella azteca	--	0.5	--	--	--	--	2.6	0.5	0.5
OLI: Oligochaeta	0.8	--	--	0.4	--	1.2	--	--	0.3
GAS: Lymnaea	--	5.4	--	--	--	--	--	--	0.7
Physa	--	--	--	--	--	5.9	--	5.9	1.5
NEM: Nematoda	--	0.1	--	--	--	--	--	--	<.1
NMT: Nematomorpha	--	--	--	--	--	--	--	55.9	7.0
Totals	1.6	14.0	93.6	20.5	2170	1133	24.6	90.0	443. (3547)

Table E112. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Mizpah Creek near Mizpah.

Taxa/Collection Date	6/15/78	7/05/78	7/21/78	7/31/78	9/06/78	10/09/78	5/12/79	8/09/79	Means
COL: Dytiscidae (L)	--	--	--	--	--	0.3	--	--	<.1
Stenelmis (L)	--	--	--	--	--	0.2	--	--	<.1
DIP: Bezzia-Probezzia	--	--	--	--	--	0.2	--	--	<.1
Bezzia-Probezzia-Palpomyia	--	--	2.0	--	--	--	--	--	0.3
Chironomidae	0.2	0.3	1.0	0.1	7.6	5.6	0.1	9.2	3.0
Hemerodromia	--	--	--	--	0.7	--	--	--	0.1
Muscidae	--	--	--	1.7	--	--	--	--	0.2
Simulium (L)	2.6	--	0.9	--	2.3	--	0.9	--	0.8
Simulium (P)	--	0.4	--	--	--	--	--	--	<.1
EPH: Baetidae	--	--	--	--	2.2	--	--	--	0.3
Baetis	0.3	--	--	--	--	--	--	--	<.1
Caenis	--	0.1	2.1	0.1	--	87.0	--	--	11.2
Heptageniidae	--	0.1	--	--	--	--	--	--	<.1
Heptagenia	--	--	--	0.3	--	--	--	--	<.1
Leptophlebiidae	--	--	--	--	--	2.0	--	--	0.3
Choroterpes	--	--	--	--	--	--	--	5.2	0.7
HEM: Heteroptera (L)	--	0.1	--	--	--	--	--	--	<.1
Sigara (A)	--	--	--	--	--	--	--	0.8	0.1
Ambrysus mormon (A)	--	--	--	--	--	--	--	12.5	1.6
ZYG: Ischnura	--	--	--	--	--	15.5	--	--	1.9
TRI: Cheumatopsyche	0.4	0.4	0.9	--	666.	3.5	0.4	84.9	94.6
Hydropsyche	--	--	--	--	21.2	--	--	--	2.7
Ithytrichia (P)	--	p	--	--	--	--	--	16.8	2.1
Polycentropus	--	--	--	--	--	--	--	1.1	0.1
AMP: Hyalella azteca	--	0.5	1.5	--	--	18.9	--	--	2.6
OLI: Oligochaeta	0.4	--	0.4	--	--	--	--	--	0.1
GAS: Physa	--	--	--	--	--	5.9	--	11.8	2.2
Totals	3.9	1.9	8.8	2.2	700.	139.	1.4	142.	125. (999.)

Table E113. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from the West Fork of Armells Creek near Colstrip and from lower Armells Creek near Forsyth.

	West Fork Armells			Lower Armells Creek			
	1978	1979		1979 Samples			
Taxa/Collection Date	5/28	7/03	Means	7/03	8/22	11/07	Means
COL: Agabus (L)	0.6	--	0.3	--	--	--	--
Berosus (L)	--	1.0	0.5	--	--	--	--
DIP: Bezzia-Probezzia-Palpomyia	--	--	--	--	--	0.7	0.2
Chironomidae	0.1	11.8	6.0	0.1	3.3	13.6	5.7
Scatophagidae	--	1.9	1.0	--	--	--	--
Simulium	26.6	1.9	14.3	--	--	0.9	0.3
Tabanus	--	--	--	--	15.6	--	5.2
Tipulidae	33.9	--	17.0	--	--	--	--
EPH: Caenis	--	0.6	0.3	--	--	24.9	8.3
Choroterpes	--	--	--	--	17.7	--	5.9
HEM: Ambrysus mormon (A)	--	--	--	p	112.	25.0	45.7
ANI: Libellulidae	--	8.1	4.1	--	--	--	--
ZYG: Argia	--	--	--	--	--	4.0	1.3
Ischnura	--	11.7	5.9	--	--	6.0	2.0
TRI: Cheumatopsyche	--	--	--	--	17.2	0.6	5.9
Ithytrichia	--	--	--	--	1.4	--	0.5
Polycentropus	--	--	--	--	--	0.5	0.2
AMP: Hyalella azteca	--	0.5	0.3	--	--	--	--
OLI: Oligochaeta	--	--	--	--	--	0.4	0.1
GAS: Lymnaea	--	57.0	28.5	--	--	--	--
Physa	--	--	--	p	316.	8.4	108.
Totals	61.2	94.5	78.2	0.1	483.	85.0	189.

Table E114. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Sweeney Creek near Rosebud.

Taxa/Collection Date	5/28/78	7/12/78	5/13/79	8/21/79	Means
COL:Dubiraphia (L)	--	--	1.5	0.4	0.5
Microcylloepus (L)	--	--	0.2	--	<.1
Microcylloepus (A)	--	--	--	0.2	<.1
Berosus (L)	--	--	6.2	1.0	1.8
DIP:Ceratopogonidae	--	0.2	--	--	<.1
Bezzia-Probezzia	--	--	2.0	--	0.5
Chironomidae	0.3	4.3	7.4	10.2	5.6
Simulium	6.8	--	2.0	0.8	2.4
Tipula	--	--	--	3.5	0.9
EPH:Caenis	2.8	1.6	5.8	--	2.6
Leptophlebiidae	--	--	0.9	--	0.2
Choroterpes	--	--	--	7.8	2.0
HEM:Ambrysus mormon (A)	--	--	--	87.3	21.8
TRI:Cheumatopsyche	--	3.8	7.6	62.0	18.4
Hydropsyche	--	--	--	6.5	1.6
Ithytrichia	--	--	--	2.1	0.5
OLI:Oligochaeta	--	0.4	0.4	--	0.2
GAS:Physa	--	p	--	247.	61.8
Totals	9.9	10.3	34.0	429.	121. (483.)

Table E115. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Reservation Creek near Forsyth-Hysham.

Taxa/Collection Date	5/28/78	7/12/78	8/22/78	5/13/79	8/22/78	Means
COL: Agabus (L)	1.2	--	2.5	--	--	0.7
Deronectes liodessus (A)	--	3.6	2.4	--	--	1.2
Oreodytes (L)	--	2.1	--	--	--	0.4
Dubiraphia (L)	--	0.4	--	--	1.5	0.4
DIP: Ceratopogonidae	--	--	0.2	--	--	<.1
Bezzia-Probezzia-Palpomyia	--	--	--	8.2	--	1.6
Palpomyia	--	0.2	--	0.4	--	0.1
Chironomidae	19.9	17.3	7.0	41.7	17.2	20.6
Hemerodromia	--	--	--	--	0.7	0.1
Simulium	19.6	--	15.7	3.4	6.7	9.1
Tabanidae	--	--	12.5	--	--	2.5
Chrysops	--	18.7	--	--	30.0	9.7
Tabanas	--	--	--	--	5.6	1.1
EPH: Baetis	0.3	--	--	--	--	0.1
Caenis	--	1.5	--	0.6	1.2	0.7
Tricorythodes	0.3	--	--	--	--	0.1
HEM: Hesperocorixa (A)	--	0.6	--	--	--	0.1
MEG: Sialis	--	7.5	2.5	--	--	2.0
ANI: Aeshna	--	--	8.5	--	--	1.7
Libellulidae	--	8.5	--	--	--	1.7
ZYG: Coenagrionidae	3.5	--	--	--	--	0.7
Argia	--	--	--	--	7.2	1.4
Ischnura	--	--	6.8	--	173.	36.0
TRI: Cheumatopsyche	--	--	37.4	14.6	700.	150.
Hydroptila	--	--	4.5	5.0	9.2	3.7
Limnephilus	8.7	--	--	--	--	1.7
Ptilostomis	--	--	27.7	--	--	5.5
AMP: Hyalella azteca	0.2	24.4	36.4	8.2	249.	63.6
OST: Ostracoda	--	1.5	--	--	--	0.3
ACA: Acari	--	0.2	--	0.7	4.7	1.1
HIR: Hirudinea	--	19.9	59.6	--	--	15.9
OLI: Oligochaeta	--	2.4	1.1	3.4	5.6	2.5
GAS: Gyraulus	--	12.5	--	--	p	2.5
Physa	--	32.1	2.9	--	1495	306.
PEL: Pisidium	--	--	12.9	129.	p	28.4
Totals	53.7	153.	241.	215.	2707	673. (3370)

Table E116. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from Sarpy Creek near Hysham.

Taxa/Collection Date	7/12/78	8/22/78	5/13/79	8/22/79	Means
COL:Dubiraphia (L)	--	0.1	--	11.7	3.0
Dubiraphia (A)	--	--	--	3.0	0.8
Microcylloepus (A)	--	0.2	--	--	<.1
DIP:Bezzia-Probezzia	0.1	--	--	0.2	0.1
Chironomidae	9.0	11.2	0.6	39.9	15.2
Hemerodromia	--	0.2	--	--	<.1
Simulium (L)	11.4	3.2	--	0.4	3.8
Simulium (P)	7.3	--	--	--	1.8
EPH:Baetis	--	0.3	--	--	0.1
Caenis	0.3	--	--	4.3	1.2
Leptophlebiidae	--	0.3	--	--	0.1
Choroterpes	--	0.5	--	1.0	0.4
ANI:Gomphus	--	--	--	4.2	1.1
ZYG:Ischnura	--	--	--	6.0	1.5
TRI:Cheumatopsyche	14.5	10.6	--	12.4	9.4
Hydropsyche	1.2	0.5	0.3	--	0.5
Hydroptila	1.9	1.3	--	--	0.8
AMP:Hyalella azteca	--	1.3	--	0.9	0.6
ACA:Acari	0.2	--	--	--	<.1
OLI:Oligochaeta	0.2	0.1	--	0.6	0.2
GAS:Physa	--	--	--	139.	34.8
NMT:Nematomorpha	--	4.7	--	--	1.2
Totals	46.1	34.5	0.9	224.	76.6 (306.)

Table E117. Biomass (milligrams dry weight per square foot) of benthic macroinvertebrates collected with a Surber sampler from the Powder River near Moorhead and near Mizpah.

Taxa/Collection Date	Powder River-Moorhead 9/14/79	Powder River-Mizpah 8/09/79	Means
COL:Microcylloepus (L)	0.7	--	0.4
DIP:Chironomidae	0.7	0.2	0.5
Hemerodromia	0.2	--	0.1
Simulium	46.7	0.3	23.5
EPH:Baetis	1.0	--	0.5
Choroterpes-Leptophlebia	4.8	--	2.4
PLE:Acroneuria	11.2	--	5.6
Isoperla	0.8	--	0.4
TRI:Cheumatopsyche	57.1	39.7	48.4
Hydropsyche	32.0	6.8	19.4
Totals	155.	47.0	101. (202.)

Table F118. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the upper Rosebud Creek near Kirby station.

Taxa/Collection Date	9/05/78	10/08/78	9/15/79	11/06/79	Means
COL: Dubiraphia (L)	0.2	--	--	--	<.1
Microcylloepus (L)	0.2	--	0.4	--	0.2
Microcylloepus (A)	--	0.2	0.8	--	0.3
Optioservus (L)	--	--	0.7	2.6	0.8
Stenelmis (L)	--	--	--	--	0.0
Stenelmis (A)	--	--	--	--	0.0
DIP: Chironomidae	13.2	2.1	19.5	8.9	10.9
Empididae	--	--	--	--	0.0
Clinocera	--	--	--	--	0.0
Hemerodromia	--	--	1.1	0.3	0.4
Simulium	10.7	0.3	--	3.1	3.5
Dicranota	--	--	--	1.0	0.3
EPH: Baetis	9.1	5.4	1.2	11.9	6.9
Heptageniidae	--	--	--	--	0.0
Heptagenia	--	--	3.2	3.8	1.8
Stenonema	--	--	2.1	--	0.5
Leptophlebiidae	--	--	--	--	0.0
Choroterpes	1.0	--	--	--	0.3
Leptophlebia	--	--	--	6.1	1.5
Paraleptophlebia	--	--	34.3	--	8.6
Tricorythodes	0.6	1.3	10.0	2.2	3.5
HEM: Ambrysus mormon (A)	--	--	--	--	0.0
MEG: Sialis	--	--	--	--	0.0
ANI: Aeshna	--	--	--	--	0.0
Ophiogomphus	--	--	39.6	--	9.9
ZYG: Zygoptera	--	--	--	--	0.0
Argia	--	--	--	--	0.0
Ischnura	--	--	--	--	0.0
PLE: Isoperla	--	0.7	--	33.7	8.6
TRI: Brachycentrus	68.1	66.7	20.8	11.6	41.8
Hydropsychidae	--	--	--	--	0.0
Cheumatopsyche	1.4	33.5	72.4	107.	53.6
Hydropsyche	188.	315.	270.	253.	257.
Hydroptila	0.6	--	3.7	71.0	18.8
Oecetis	--	--	--	--	0.0
Nectopsyche	--	--	--	--	0.0
Anabolia	--	--	--	--	0.0
Neureclipsis	--	--	--	--	0.0
Polycentropus	--	--	--	--	0.0
Ptilostomis	--	--	--	--	0.0
OLI: Oligochaeta	--	--	--	--	0.0
GAS: Ferrissia	--	16.2	--	32.4	12.2
Gyraulus	--	8.4	--	--	2.1
Helisoma	--	--	--	--	0.0
Physa	9.5	--	35.0	22.1	16.7
PEL: Pisidium	--	--	--	--	0.0
Sphaerium	--	--	--	--	0.0
Totals	303.	450.	515.	571.	460. (1839)

Table F119. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the upper Rosebud Creek near Kirby station.

Taxa/Collection Date	9/05/78	10/08/78	9/15/79	11/06/79	Means
COL: Dubiraphia (L)	--	--	0.2	1.5	0.4
Microcylloepus (L)	--	--	--	0.2	<.1
Microcylloepus (A)	--	--	--	--	0.0
Optioservus (L)	--	--	1.1	--	0.3
Stenelmis (L)	--	--	--	0.6	0.2
Stenelmis (A)	--	--	2.3	--	0.6
DIP: Chironomidae	14.8	2.0	9.8	25.2	13.0
Empididae	--	--	--	--	0.0
Clinocera	--	--	--	0.7	0.2
Hemerodromia	--	--	--	--	0.0
Simulium	0.3	--	--	--	0.1
Dicranota	--	--	--	--	0.0
EPH: Baetis	0.5	0.3	0.2	2.1	0.8
Heptageniidae	--	--	--	--	0.0
Heptagenia	--	--	1.2	3.6	1.2
Stenonema	--	0.5	--	--	0.1
Leptophlebiidae	--	--	--	--	0.0
Choroterpes	2.1	--	1.6	--	0.9
Leptophlebia	--	0.7	--	41.6	10.6
Paraleptophlebia	--	--	--	--	0.0
Tricorythodes	0.3	2.9	8.2	35.2	11.7
HEM: Ambrysus mormon (A)	--	--	--	--	0.0
MEG: Sialis	--	--	--	--	0.0
ANI: Aeshna	--	--	--	--	0.0
Ophiogomphus	--	--	--	346.	86.5
ZYG: Zygoptera	--	--	--	--	0.0
Argia	--	10.4	--	--	2.6
Ischnura	--	--	--	12.0	3.0
PLE: Isoperla	--	0.8	--	0.2	0.3
TRI: Brachycentrus	253.	216.	66.1	51.2	147.
Hydropsychidae	5.6	--	--	--	1.4
Cheumatopsyche	--	--	1.2	1.6	0.7
Hydropsyche	31.9	9.9	19.2	207.	67.0
Hydroptila	--	--	0.6	80.1	20.2
Oecetis	--	--	--	7.9	2.0
Nectopsyche	--	--	--	16.8	4.2
Anabolia	--	--	--	494.	124.
Neureclipsis	--	--	--	--	0.0
Polycentropus	--	--	0.4	--	0.1
Ptilostomis	--	--	--	15.6	3.9
OLI: Oligochaeta	9.0	--	--	3.1	3.0
GAS: Ferrisia	--	--	24.8	44.0	17.2
Gyraulus	--	--	--	--	0.0
Helisoma	--	--	--	p	p
Physa	--	--	17.4	50.4	17.0
PEL: Pisidium	--	--	--	--	0.0
Sphaerium	--	--	--	41.8	10.5
Totals	318.	244.	154.	1482	551. (2198)

Table F120. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the upper Rosebud Creek near Kirby station.

Taxa/Collection Date	9/05/78	10/08/78	9/15/79	11/06/79	Means
COL: Dubiraphia (L)	0.6	0.4	0.6	0.2	0.5
Microcylloepus (L)	0.4	--	--	--	0.1
Microcylloepus (A)	--	--	--	--	0.0
Optioservus (L)	--	--	--	--	0.0
Stenelmis (L)	--	--	--	--	0.0
Stenelmis (A)	--	--	--	--	0.0
DIP: Chironomidae	10.3	4.3	4.5	4.0	5.8
Empididae	--	1.1	--	--	0.3
Clinocera	0.3	--	--	--	0.1
Hemerodromia	0.5	--	--	--	0.1
Simulium	1.1	--	--	--	0.3
Dicranota	--	--	--	1.0	0.3
EPH: Baetis	--	--	--	0.3	0.1
Heptageniidae	0.9	--	--	0.8	0.4
Heptagenia	0.6	--	15.1	--	3.9
Stenonema	--	--	--	--	0.0
Leptophlebiidae	12.3	--	--	--	3.1
Choroterpes	--	2.1	2.1	--	1.1
Leptophlebia	--	--	2.5	7.2	2.4
Paraleptophlebia	--	17.0	8.5	--	6.4
Tricorythodes	13.3	5.0	2.4	0.1	5.2
HEM: Ambrysus mormon (A)	12.5	--	--	--	3.1
MEG: Sialis	--	--	2.5	2.5	1.3
ANI: Aeshna	13.6	--	--	--	3.4
Ophiogomphus	--	--	--	--	0.0
ZYG: Zygoptera	4.1	--	--	--	1.0
Argia	--	--	--	--	0.0
Ischnura	--	--	0.9	--	0.2
PLE: Isoperala	--	0.1	--	0.1	<.1
TRI: Brachycentrus	78.0	371.	24.7	23.3	124.
Hydropsychidae	--	--	--	--	0.0
Cheumatopsyche	1.3	--	16.0	2.7	5.0
Hydropsyche	4.1	31.0	--	--	8.8
Hydroptila	--	1.1	--	0.7	0.5
Oecetis	--	--	2.0	2.0	1.0
Nectopsyche	--	2.1	--	--	0.5
Anabolia	--	61.8	--	--	15.5
Neureclipsis	3.3	--	--	--	0.8
Polycentropus	--	--	0.7	2.8	0.9
Ptilostomis	--	--	--	--	0.0
OLI: Oligochaeta	0.4	--	0.4	0.8	0.4
GAS: Ferrisia	36.9	15.5	18.1	8.1	19.7
Gyraulus	4.2	--	--	--	1.1
Helisoma	--	--	--	--	0.0
Physa	9.6	9.6	57.4	47.8	31.1
PEL: Pisidium	P	--	--	--	P
Sphaerium	--	--	--	--	0.0
Totals	208.	522.	158.	104.	248. (992.)

Table 121. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Tongue River near Pyramid Butte-Birney station (the first page of two pages).

	Riffle Habitat			Riffle to Pool Habitat				Pool Habitat			
	1978	1979		1978	1979			1978	1979		
Taxa/Collection Date	10/08	9/15	Means	9/05	9/15	11/05	Means	10/08	9/15	11/05	Means
COL: Helichus striatus (A)	--	--	0.0	--	--	9.3	3.1	--	--	--	0.0
Dubiraphia (L)	0.2	2.4	1.3	--	0.2	--	0.1	--	2.6	2.2	1.6
Dubiraphia (A)	0.6	1.2	0.9	--	0.4	7.4	2.6	--	--	1.3	0.4
Microcylloepus (L)	21.4	8.0	14.7	--	0.6	1.5	0.7	--	3.3	8.5	3.9
Microcylloepus (A)	6.2	14.0	10.1	--	1.1	1.3	0.8	--	0.3	0.9	0.4
Stenelmis (L)	6.3	5.1	5.7	76.7	1.4	--	26.0	--	2.6	--	0.9
Stenelmis (A)	1.4	22.0	11.7	--	21.0	50.0	23.7	--	31.4	77.8	36.4
DIP: Chironomidae	0.8	0.7	0.8	1.6	0.6	1.7	1.3	0.4	1.0	5.0	2.1
Simulium	0.3	2.3	1.3	--	0.3	--	0.1	--	--	--	0.0
EPH: Ephemeroptera	--	--	0.0	0.1	--	--	<.1	--	--	--	0.0
Baetis	6.1	3.1	4.6	--	--	--	0.0	0.5	1.0	1.0	0.8
Ephemerella	3.0	--	1.5	--	--	--	0.0	--	--	--	0.0
Ephemera	--	--	0.0	--	--	--	0.0	--	1.8	--	0.6
Stenonema	--	10.8	5.4	4.8	6.0	62.4	24.4	0.5	3.4	7.8	3.9
Choroterpes	--	58.8	29.4	5.8	14.5	4.8	8.4	0.2	14.6	2.9	5.9
Leptophlebia	--	--	0.0	--	--	19.5	6.5	--	--	50.2	16.7
Paraleptophlebia	--	--	0.0	--	--	4.3	1.4	--	--	--	0.0
Tricorythodes	3.0	--	1.5	3.2	--	--	1.1	4.2	0.4	1.1	1.9
HEM: Hesperocorixa vulgaris (A)	--	--	0.0	--	--	19.8	6.6	--	--	--	0.0
Ambrysus mormon (A)	6.2	12.3	9.3	24.6	--	--	8.2	--	--	12.3	4.1
Saldidae (L)	1.6	--	0.8	--	--	--	0.0	--	--	--	0.0

Table F121. Continued (the second page of two pages).

Taxa/Collection Date	Riffle Habitat 1978 10/08	Riffle Habitat 1979 9/15	Riffle Habitat Means	Riffle to Pool Habitat 1978 9/05	Riffle to Pool Habitat 1979 9/15	Riffle to Pool Habitat 1979 11/05	Riffle to Pool Habitat Means	Pool Habitat 1978 10/08	Pool Habitat 1979 9/15	Pool Habitat 1979 11/05	Pool Habitat Means
ANI: Ophiogomphus	--	--	0.0	--	--	--	0.0	--	27.6	--	9.2
PLE: Chloroperlidae	1.3	--	0.7	--	--	--	0.0	--	--	--	0.0
Acroneuria	--	8.1	4.1	--	--	35.6	11.9	--	14.2	--	4.7
TRI: Brachycentrus	--	--	0.0	4.4	--	--	1.5	--	--	--	0.0
Helicopsyche	--	14.6	7.3	--	--	115.	38.3	--	--	--	0.0
Cheumatopsyche	5.9	--	3.0	5.9	--	--	2.0	1.0	--	--	0.3
Hydropsyche	11.5	--	5.8	--	3.4	81.4	28.3	--	12.8	--	4.3
Hydroptila	2.2	--	1.1	--	--	10.4	3.5	--	--	3.7	1.2
Ithytrichia	0.2	--	0.1	--	--	--	0.0	--	--	--	0.0
Nectopsyche	24.0	29.3	26.7	516.	5.7	539.	354.	96.8	19.6	44.3	53.6
Oecetis	--	15.7	7.9	--	--	2.9	1.0	--	6.4	23.4	9.9
Polycentropus	--	--	0.0	--	--	--	0.0	0.5	--	--	0.2
AMP: Hyalella azteca	--	--	0.0	--	--	3.5	1.2	--	--	1.8	0.6
HIR: Hirudinea	22.7	--	11.4	22.7	--	--	7.6	--	--	--	0.0
Placobdella papillifera	--	53.4	26.7	--	--	--	0.0	--	--	--	0.0
OLI: Oligochaeta	--	--	0.0	--	0.4	--	0.1	0.8	--	4.1	2.0
GAS: Physa	3.5	84.0	43.8	--	17.8	11.8	9.9	--	23.2	111.	44.7
PEL: Pelecypoda	--	--	0.0	--	--	--	0.0	--	6.8	--	2.3
TUR: Turbellaria	9.0	16.3	12.7	23.8	8.8	5.7	12.8	1.5	25.2	13.3	13.3
Totals	137.	362.	250. (499.)	691.	82.2	987.	587. (1760)	106.	198.	373.	226. (677.)

Table F122. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Squirrel Creek near Decker station.

Taxa/Collection Date	Riffle Habitat			Riffle to Pool Habitat			Pool Habitat		
	9/15/79	11/06/79	Means	9/15/79	11/06/79	Means	9/15/79	11/06/79	Means
COL: Dubiraphia (L)	0.8	--	0.4	32.8	45.3	39.1	33.7	11.3	22.5
Dubiraphia (A)	--	--	0.0	--	2.7	1.4	--	--	0.0
Microcylloepus (L)	--	0.9	0.5	--	--	0.0	--	--	0.0
Microcylloepus pusillus (A)	--	--	0.0	3.0	--	1.5	--	--	0.0
Optioservus (L)	3.6	--	1.8	2.0	5.2	3.6	--	--	0.0
Stenelmis (L)	--	--	0.0	2.4	--	1.2	--	--	0.0
DIP: Bezzia-Probezzia	--	0.5	0.3	--	--	0.0	--	--	0.0
Chironomidae	33.2	10.1	21.7	66.6	153.	110.	19.7	25.6	22.7
Hemerodromia	2.7	1.0	1.9	0.8	--	0.4	--	--	0.0
Muscidae	--	7.8	3.9	--	--	0.0	--	--	0.0
Simulium	5.5	14.5	10.0	0.4	4.0	2.2	--	--	0.0
Dicranota	--	2.2	1.1	--	--	0.0	--	--	0.0
EPH: Baetis	--	--	0.0	--	--	0.0	--	1.0	0.5
Caenis	--	--	0.0	1.2	7.3	4.3	0.7	0.3	0.5
HEM: Ambrysus mormon (A)	--	--	0.0	--	12.3	6.2	--	--	0.0
MEG: Sialis	--	--	0.0	--	--	0.0	13.7	--	6.9
ANI: Aeshna	--	--	0.0	--	--	0.0	14.9	2.1	8.5
ZYG: Ischnura	--	--	0.0	--	25.5	12.8	4.0	25.5	14.8
TRI: Brachycentrus	--	23.2	11.6	34.9	160.	97.5	--	--	0.0
Cheumatopsyche	111.	169.	140.	168.	505.	337.	0.1	--	<.1
Hydropsyche	1113	884.	999.	73.4	693.	383.	2.4	0.3	1.4
Hydroptila	3.7	4.9	4.3	8.8	19.8	14.3	--	--	0.0
Ptilostomis	--	--	0.0	--	13.2	6.6	--	39.6	19.8
Polycentropus	--	--	0.0	8.4	--	4.2	4.7	0.5	2.6
AMP: Hyalella azteca	--	--	0.0	--	--	0.0	--	0.9	0.5
ACA: Acari	--	0.5	0.3	--	0.6	0.3	--	--	0.0
HIR: Placobdella papillifera	--	--	0.0	--	--	0.0	87.7	--	43.9
GAS: Gyraulus	--	16.7	8.4	--	--	0.0	--	--	0.0
Physa	--	--	0.0	114.	199.	157.	24.0	5.5	14.8
Totals	1274	1135	1205 (2409)	517.	1846	1183 (2363)	206.	113.	159. (318.)

Table F123. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the upper Hanging Woman Creek near Quietus-Decker station.

Taxa/Collection Date	9/05/78a	9/14/79b	11/05/79b	Means
COL:Helichus striatus (A)	--	10.0	--	3.3
Dubiraphia (L)	0.2	--	--	0.1
Dubiraphia (A)	--	--	--	0.0
Microcylloepus (L)	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	--	0.0
Chironomidae	1.2	0.4	2.3	1.3
Hemerodromia	0.2	--	--	0.1
Simulium (L)	112.	0.4	149.	87.1
Simulium (P)	--	--	--	0.0
Tipulidae	--	--	--	0.0
EPH:Baetis	--	--	--	0.0
Caenis	--	--	--	0.0
Choroterpes	--	--	--	0.0
HEM:Corixidae (A)	--	--	--	0.0
Ambrysus mormon (A)	--	6.1	--	2.0
MEG:Sialis	--	--	--	0.0
ZYG:Hetaerina	--	57.0	156.	71.0
Hetaerina americana	30.0	--	--	10.1
Argia	--	--	--	0.0
Ischnura	9.3	--	--	3.1
TRI:Cheumatopsyche	98.3	58.9	59.2	72.1
Hydropsyche	8.6	9.9	1.9	6.8
Hydroptila	--	--	1.1	0.4
Ithytrichia	0.3	p	--	0.1
Limnephilus	--	--	13.3	4.4
Polycentropus	--	--	--	0.0
AMP:Hyalella azteca	--	0.4	--	0.1
OST:Ostracoda	--	--	--	0.0
ACA:Acari	--	--	0.2	0.1
GAS:Gyraulus	--	0.5	20.9	7.1
Physa	17.9	1084	378.	493.
Columnella	--	--	--	0.0
Totals	278.	1228	782.	462. (2288)

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D.

Table F124. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the upper Hanging Woman Creek near Quietus-Decker station.

Taxa/Collection Date	9/05/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL:Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	--	5.7	--	1.4
Dubiraphia (A)	--	--	--	--	0.0
Microcylloepus (L)	--	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	0.9	--	0.2
Chironomidae	1.2	3.5	18.3	15.1	9.5
Hemerodromia	--	--	--	0.7	0.2
Simulium (L)	8.8	--	--	8.8	4.4
Simulium (P)	5.2	--	--	--	1.3
Tipulidae	--	--	24.9	--	6.2
EPH:Baetis	--	--	0.5	--	0.1
Caenis	0.3	0.9	1.2	--	0.6
Choroterpes	--	--	--	--	0.0
HEM:Corixidae (A)	1.8	--	--	--	0.5
Ambrysus mormon (A)	5.4	--	--	12.5	4.5
MEG:Sialis	--	--	5.0	--	1.3
ZYG:Hetaerina	--	--	4.8	36.0	10.2
Hetaerina americana	4.8	4.8	--	--	2.4
Argia	--	--	1.4	--	0.4
Ischnura	--	--	--	--	0.0
TRI:Cheumatopsyche	191.	0.6	1.1	14.4	51.8
Hydropsyche	26.1	--	--	0.8	6.7
Hydroptila	--	--	--	7.0	1.8
Ithytrichia	0.2	--	--	--	<.1
Limnephilus	--	--	--	48.7	12.2
Polycentropus	1.1	1.6	41.4	--	11.0
AMP:Hyalella azteca	0.7	1.0	1.3	5.2	2.1
OST:Ostracoda	--	--	1.0	--	0.3
ACA:Acari	--	--	--	--	0.0
GAS:Gyraulus	2.3	--	--	46.7	12.3
Physa	390.	49.7	58.8	348.	212.
Columnella	--	--	--	--	0.0
Totals	639.	62.1	166.	544.	353. (1411)

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D.

Table F125. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the upper Hanging Woman Creek near Quietus-Decker station.

Taxa/Collection Date	9/05/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL: Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	0.2	5.0	--	1.3
Dubiraphia (A)	--	--	0.7	--	0.2
Microcylloepus (L)	--	--	--	0.2	<.1
DIP: Bezzia-Probezzia	--	--	--	--	0.0
Chironomidae	1.1	3.6	4.0	8.5	4.3
Hemerodromia	--	--	--	--	0.0
Simulium (L)	0.3	--	--	2.3	0.7
Simulium (P)	--	--	--	--	0.0
Tipulidae	--	--	--	--	0.0
EPH: Baetis	--	--	--	--	0.0
Caenis	4.6	6.4	14.1	1.0	6.5
Choroterpes	--	--	--	0.5	0.1
HEM: Corixidae (A)	--	--	--	--	0.0
Ambrysus mormon (A)	--	--	--	--	0.0
MEG: Sialis	--	--	--	--	0.0
ZYG: Hetaerina	--	--	--	--	0.0
Hetaerina americana	--	--	--	--	0.0
Argia	8.1	--	32.3	8.1	12.1
Ischnura	5.8	8.7	--	5.8	5.1
TRI: Cheumatopsyche	77.5	0.7	2.9	--	20.3
Hydropsyche	9.1	--	--	0.7	2.5
Hydroptila	--	--	--	0.4	0.1
Ithytrichia	0.2	--	--	--	<.1
Limnephilus	--	--	--	4.4	1.1
Polycentropus	0.9	5.3	--	0.4	1.7
AMP: Hyalella azteca	--	4.6	6.1	3.6	3.6
OST: Ostracoda	--	--	--	--	0.0
ACA: Acari	--	--	--	--	0.0
GAS: Gyraulus	--	--	--	12.5	3.1
Physa	35.5	--	35.5	82.8	38.5
Columnella	--	--	p	--	p
Totals	143.	29.5	101.	131.	101. (404.)

Sampling Locations: a--T08S,R43E,16C; b--T08S,R43E,17D.

Table F126. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the lower Hanging Woman Creek near Birney station.

Taxa/Collection Date	9/09/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL: Curculionidae (L)	--	--	17.6	--	4.4
Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	--	--	--	0.0
Dubiraphia (A)	--	--	1.5	--	0.4
Microcylloepus (L)	--	--	1.5	--	0.4
Microcylloepus (A)	--	--	--	--	0.0
DIP: Bezzia-Probezzia	--	--	--	--	0.0
Chironomidae	6.5	8.1	7.4	44.0	16.5
Hemerodromia	--	--	10.9	2.6	3.4
Simulium (L)	235.	540.	120.	226.	280.
Simulium (P)	--	181.	--	--	45.3
Dicranota	--	--	--	--	0.0
EPH: Baetis	--	--	1.0	--	0.3
Caenis	0.2	--	--	2.4	0.7
Paraleptophlebia	--	--	--	--	0.0
MEG: Sialis	--	--	--	--	0.0
ZYG: Hetaerina	--	5.1	22.0	11.4	9.6
Coenagrionidae	--	--	--	--	0.0
Argia	--	--	--	--	0.0
Ischnura	--	--	--	--	0.0
TRI: Brachycentrus	--	--	--	--	0.0
Helicopsyche	--	--	--	--	0.0
Cheumatopsyche	18.9	22.4	592.	433.	267.
Hydropsyche	21.3	22.4	131.	1165	335.
Hydroptila	0.1	--	--	29.4	7.4
Ithytrichia	--	--	--	--	0.0
Oecetis	--	--	--	--	0.0
Nyctiophylax	--	--	--	--	0.0
Polycentropus	--	--	--	--	0.0
OLI: Oligochaeta	--	--	--	--	0.0
GAS: Physa	--	82.9	46.9	105.	58.7
Totals	282.	862.	952.	2019	1029 (4115)

Sampling Locations: a--T06S,R43E,18D; b--T06S, R43E,19D.

Table F127. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the lower Hanging Woman Creek near Birney station.

Taxa/Collection Date	9/09/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL:Curculionidae (L)	--	--	--	--	0.0
Helichus striatus (A)	--	--	--	8.6	2.2
Dubiraphia (L)	--	0.5	4.7	--	1.3
Dubiraphia (A)	--	--	--	0.7	0.2
Microcylloepus (L)	--	--	0.4	0.7	0.3
Microcylloepus (A)	--	--	0.2	--	<.1
DIP:Bezzia-Probezzia	--	--	0.7	--	0.2
Chironomidae	7.7	1.2	3.7	30.1	10.7
Hemerodromia	--	--	--	2.4	0.6
Simulium (L)	57.7	1.8	12.8	16.6	22.2
Simulium (P)	--	--	--	--	0.0
Dicranota	--	--	--	6.0	1.5
EPH:Baetis	--	--	--	0.5	0.1
Caenis	--	--	21.5	0.8	5.6
Paraleptophlebia	--	--	--	10.8	2.7
MEG:Sialis	--	--	5.0	--	1.3
ZYG:Hetaerina	--	14.5	--	77.3	23.0
Coenagrionidae	--	--	--	--	0.0
Argia	--	--	32.3	--	8.1
Ischnura	--	3.0	--	--	0.8
TRI:Brachycentrus	--	--	--	2.2	0.6
Helicopsyche	--	--	--	3.6	0.9
Cheumatopsyche	5.4	15.8	5.4	116.	35.7
Hydropsyche	3.4	--	22.0	202.	56.9
Hydroptila	--	--	--	17.2	4.3
Ithytrichia	--	--	0.2	--	<.1
Oecetis	--	--	--	11.8	3.0
Nyctiophylax	--	--	1.0	--	0.3
Polycentropus	--	--	5.5	--	1.4
OLI:Oligochaeta	--	--	0.4	--	0.1
GAS:Physa	59.1	17.9	31.4	174.	70.6
Totals	133.	54.7	147.	681.	255. (1016)

Sampling Locations: a--T06S,R43E,18D; b--T06S,R43E,19D.

Table F128. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the lower Hanging Woman Creek near Birney station.

Taxa/Collection Date	9/09/78a	10/07/78a	9/14/79b	11/05/79b	Means
COL: Curculionidae (L)	--	--	--	--	0.0
Helichus striatus (A)	--	--	--	--	0.0
Dubiraphia (L)	--	--	1.4	--	0.4
Dubiraphia (A)	--	--	--	--	0.0
Microcylloepus (L)	--	--	--	--	0.0
Microcylloepus (A)	--	--	--	--	0.0
DIP: Bezzia-Probezzia	--	--	--	--	0.0
Chironomidae	2.7	--	7.2	3.3	3.3
Hemerodromia	--	--	--	--	0.0
Simulium (L)	--	0.1	0.4	0.3	0.2
Simulium (P)	--	--	--	--	0.0
Dicranota	--	--	--	--	0.0
EPH: Baetis	--	--	--	--	0.0
Caenis	--	--	14.6	3.5	4.5
Paraleptophlebia	--	--	--	--	0.0
MEG: Sialis	--	--	5.4	--	1.4
ZYG: Hetaerina	--	--	--	--	0.0
Coenagrionidae	7.0	--	--	--	1.8
Argia	--	--	3.8	--	1.0
Ischnura	--	1.9	6.4	--	2.1
TRI: Brachycentrus	--	--	--	--	0.0
Helicopsyche	--	--	--	--	0.0
Cheumatopsyche	--	0.1	--	3.0	0.8
Hydropsyche	--	--	1.0	--	0.3
Hydroptila	--	--	--	0.4	0.1
Ithytrichia	--	--	--	--	0.0
Oecetis	--	--	--	--	0.0
Nyctiophylax	--	--	--	--	0.0
Polycentropus	--	--	0.4	--	0.1
OLI: Oligochaeta	--	--	--	--	0.0
GAS: Physa	19.5	25.3	33.2	--	19.5
Totals	29.2	27.4	73.8	10.5	35.5 (141.)

Sampling Locations: a--T06S,R43E,18D; b--T06S,R43E,19D.

Table F129. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the East Fork of Hanging Woman Creek near Birney station.

	Riffle Habitat			Riffle to Pool Habitat			Pool Habitat		
Taxa/Collection Date	9/29/79	11/05/79	Means	9/29/79	11/05/79	Means	9/29/79	11/05/79	Means
COL:Helichus striatus (A)	14.0	--	7.0	--	--	0.0	--	--	0.0
DIP:Bezzia-Probezzia	--	0.9	0.5	--	0.2	0.1	--	--	0.0
Palpomyia	--	--	0.0	1.8	--	0.9	0.7	--	0.4
Chironomidae	0.2	3.0	1.6	0.1	0.5	0.3	1.8	5.9	3.9
Psychodidae	--	1.3	0.7	0.4	--	0.2	--	--	0.0
Simulium	4.3	33.5	18.9	--	4.8	2.4	3.0	0.5	1.8
Dicranota	--	7.6	3.8	1.0	--	0.5	--	--	0.0
Tipula	--	--	0.0	--	5.1	2.6	--	--	0.0
EPH:Baetis	13.0	50.6	31.8	23.2	5.2	14.2	0.7	2.5	1.6
Choroterpes	--	--	0.0	--	--	0.0	--	1.0	0.5
Paraleptophlebia	6.4	--	3.2	15.0	--	7.5	17.1	--	8.6
ANI:Aeshna	--	--	0.0	--	--	0.0	--	3.2	1.6
TRI:Cheumatopsyche	--	1.2	0.6	--	0.2	0.1	1.0	--	0.5
Hydropsyche	--	13.6	6.8	--	--	0.0	--	--	0.0
Hydroptila	--	6.1	3.1	--	0.9	0.5	0.4	0.2	0.3
Hesperophylax	16.5	566.	291.	48.5	283.	166.	--	--	0.0
Limnephilus	8.9	--	4.5	8.9	3.8	6.4	4.4	--	2.2
AMP:Hyalella azteca	--	1.8	0.9	1.5	3.4	2.5	--	--	0.0
ACA:Acari	--	--	0.0	0.5	--	0.3	--	--	0.0
OLI:Oligochaeta	--	--	0.0	11.2	1.2	6.2	3.1	0.8	2.0
GAS:Physa	--	22.1	11.1	29.6	0.4	15.0	--	--	0.0
Columnella	--	--	0.0	p	--	p	--	--	0.0
PEL:Pisidium	--	--	0.0	42.0	--	21.0	--	--	0.0
Totals	63.3	708.	386. (771.)	184.	309.	247. (493.)	32.2	14.1	23.4 (46.3)

Table F130. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle type of habitat at the lower Otter Creek near Ashland station.

Taxa/Collection Date	9/04/78	9/29/79	11/06/79	Means
COL: Dubiraphia (L)	--	--	--	0.0
Microcylloepus (L)	--	1.8	2.4	1.4
Microcylloepus (A)	--	0.9	--	0.3
Stenelmis (L)	--	5.3	--	1.8
Stenelmis (A)	--	5.6	--	1.9
DIP: Bezzia-Probezzia	--	--	--	0.0
Chironomidae	2.6	7.5	86.4	32.2
Hemerodromia	0.7	1.3	1.4	1.1
Simulium	2.2	1.9	411.	138.
EPH: Caenis	0.6	1.2	10.4	4.1
HEM: Ambrysus mormon (A)	119.	--	--	39.7
MEG: Sialis	--	--	--	0.0
ANI: Gomphus	--	--	--	0.0
ZYG: Hetaerina	--	91.2	56.8	49.3
Argia	--	15.1	20.8	12.0
Ischnura	--	--	7.2	2.4
TRI: Cheumatopsyche	35.8	70.1	249.	118.
Hydropsyche	5.1	4.3	13.6	7.7
Hydroptila	9.1	42.8	31.2	27.7
Nectopsyche	--	--	--	0.0
Ptilostomis	--	--	--	0.0
Polycentropus	--	2.0	--	0.7
AMP: Hyalella azteca	--	--	--	0.0
OLI: Oligochaeta	--	--	--	0.0
GAS: Gyraulus	--	--	--	0.0
Physa	--	22.1	120.	47.4
PEL: Pisidium	--	--	11.2	3.7
NMT: Nematomorpha	--	--	96.8	33.3
Totals	175.	273.	1118	522. (1566)

Table F131. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a riffle to pool type of habitat at the lower Otter Creek near Ashland station.

Taxa/Collection Date	9/04/78	10/08/78	9/29/79	11/06/79	Means
COL:Dubiraphia (L)	--	--	1.1	--	0.3
Microcylloepus (L)	--	0.2	1.6	1.5	0.8
Microcylloepus (A)	--	--	--	--	0.0
Stenelmis (L)	--	--	0.9	--	0.2
Stenelmis (A)	--	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	0.4	--	0.1
Chironomidae	11.7	1.1	34.9	146.	48.4
Hemerodromia	--	0.2	--	1.3	0.4
Simulium	0.6	--	0.6	47.0	12.1
EPH:Caenis	5.1	3.7	1.5	1.5	3.0
HEM:Ambrysus mormon (A)	--	--	--	--	0.0
MEG:Sialis	--	--	--	--	0.0
ANI:Gomphus	--	--	4.2	--	1.1
ZYG:Hetaerina	--	--	--	228.	57.0
Argia	36.5	6.2	7.5	--	12.6
Ischnura	--	9.9	4.2	--	3.5
TRI:Cheumatopsyche	6.7	21.4	105.	93.1	56.6
Hydropsyche	--	7.2	4.0	35.8	11.8
Hydroptila	5.2	1.2	3.1	39.2	12.2
Nectopsyche	--	--	--	--	0.0
Ptilostomis	--	--	--	--	0.0
Polycentropus	--	1.0	4.2	5.6	2.7
AMP:Hyalella azteca	--	0.5	--	--	0.1
OLI:Oligochaeta	--	--	--	--	0.0
GAS:Gyraulus	--	--	--	--	0.0
Physa	--	16.6	22.1	88.5	31.8
PEL:Pisidium	--	--	--	--	0.0
NMT:Nematomorpha	--	--	--	--	0.0
Totals	65.8	69.2	195.	688.	255. (1018)

Table F132. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into a pool type of habitat at the lower Otter Creek near Ashland station.

Taxa/Collection Date	9/04/78	10/08/78	9/29/79	11/06/79	Means
COL:Dubiraphia (L)	--	0.2	0.6	--	0.2
Microcylloepus (L)	--	--	0.2	--	<.1
Microcylloepus (A)	--	--	--	--	0.0
Stenelmis (L)	--	1.3	0.6	--	0.5
Stenelmis (A)	--	--	--	--	0.0
DIP:Bezzia-Probezzia	--	--	0.2	--	<.1
Chironomidae	1.2	0.2	5.8	4.3	2.9
Hemerodromia	--	--	--	--	0.0
Simulium	--	--	0.3	0.6	0.2
EPH:Caenis	2.5	2.2	4.9	1.4	2.8
HEM:Ambrysus mormon (A)	--	--	--	--	0.0
MEG:Sialis	2.5	--	2.5	--	1.3
ANI:Gomphus	--	--	--	--	0.0
ZYG:Hetaerina	--	--	--	--	0.0
Argia	4.0	--	20.2	--	6.1
Ischnura	1.5	4.0	--	2.1	1.9
TRI:Cheumatopsyche	--	2.0	1.0	0.3	0.8
Hydropsyche	--	--	--	--	0.0
Hydroptila	--	0.4	--	--	0.1
Nectopsyche	2.1	--	--	--	0.5
Ptilostomis	--	7.8	--	--	2.0
Polycentropus	--	1.0	4.4	--	1.4
AMP:Hyalella azteca	--	--	--	--	0.0
OLI:Oligochaeta	--	--	1.6	0.2	0.5
GAS:Gyraulus	4.2	--	--	--	1.1
Physa	11.8	--	23.7	5.9	10.4
PEL:Pisidium	--	--	--	--	0.0
NMT:Nematomorpha	--	--	--	--	0.0
Totals	29.8	19.1	66.0	14.8	32.7 (130.)

Table F133. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Pumpkin Creek near Miles City station (1).

Taxa/Collection Date	9/06/78	10/09/78	Means	9/06/78	10/09/78	Means
COL: Microcylloepus (L)	5.6	--	2.8	--	--	0.0
Microcylloepus (A)	0.9	--	0.5	--	--	0.0
Stenelmis (A)	--	--	0.0	1.1	--	0.6
DIP: Bezzia-Probezzia	1.2	--	0.6	--	--	0.0
Chironomidae	40.0	5.3	22.7	0.7	4.3	2.5
Hemerodromia	0.7	0.3	0.5	--	--	0.0
EPH: Baetis	--	0.5	0.3	--	--	0.0
Caenis	6.8	2.2	4.5	0.6	6.1	3.4
Tricorythodes	--	0.3	0.2	--	--	0.0
MEG: Sialis	--	--	0.0	--	3.3	1.7
ZYG: Coenagrionidae	--	3.5	1.8	--	--	0.0
Argia	--	--	0.0	4.0	--	2.0
Ischnura	--	--	0.0	3.0	--	1.5
TRI: Cheumatopsyche	83.2	24.0	53.6	0.9	6.5	3.7
Hydropsyche	15.2	3.8	9.5	1.7	--	0.9
Ithytrichia	0.8	--	0.4	0.6	--	0.3
Polycentropus	--	0.5	0.3	--	1.1	0.6
AMP: Hyalella azteca	--	6.2	3.1	1.0	1.0	1.0
Totals	154.	46.6	101. (201.)	13.6	22.3	18.2 (35.9)

(1) Riffle data from artificial substrates are not available for this site.

Table F134. Biomass (milligrams dry weight) of benthic macroinvertebrates collected from duplicate jumbo multiplate samplers placed into three types of habitats at the Mizpah Creek near Mizpah station.

Taxa/Collection Date	Riffle Habitat			Riffle to Pool Habitat	Pool Habitat		
	9/06/78	10/09/78	Means	9/06/78	9/06/78	10/09/78	Means
COL: Helichus striatus (A)	4.7	--	2.4	--	--	--	0.0
DIP: Bezzia-Probezzia	--	--	0.0	--	--	0.2	0.1
Chironomidae	0.2	4.7	2.5	0.7	--	0.2	0.1
EPH: Baetis	--	0.3	0.2	--	--	--	0.0
Caenis	--	6.5	3.3	--	--	0.4	0.2
HEM: Ambrysus mormon (A)	12.5	--	6.3	--	--	--	0.0
ZYG: Argia	--	--	0.0	4.0	--	--	0.0
Ischnura	--	1.4	0.7	--	--	--	0.0
TRI: Cheumatopsyche	--	2.0	1.0	--	--	--	0.0
AMP: Hyalella azteca	--	1.0	0.5	0.5	1.0	--	0.5
OLI: Oligochaeta	--	--	0.0	--	--	0.4	0.2
GAS: Physa	1.8	17.8	9.8	1275	55.0	5.9	30.5
Totals	19.2	33.7	26.7 (52.9)	1280	56.0	7.1	31.6 (63.1)

Table G135. Physical measurements taken in association with the Surber benthic macroinvertebrate collections with depth at the sampling point and stream width in feet, with current velocity at the sampling point in feet per second, and with estimated stream flow in cubic feet per second (the first page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Upper Rosebud Creek/Kirby	06/16/78	2.1	11.0	2.8	65	6.3	(a)
same	06/29/78	0.7	11.6	3.3	27	5.5	(b)
same	07/18/78	1.0	9.2	2.3	21	5.2	(c)
same	08/03/78	0.9	10.3	1.7	16	5.3	(d)
same	08/29/78	0.7	5.9	2.9	12	6.5	(d)
same	09/05/78	0.6	6.7	2.7	11	5.4	(d)
same	10/08/78	0.7	9.7	2.2	15	6.6	(d)
same	11/05/78	1.0	7.9	3.1	24	6.0	(b)
same	04/01/79	1.8	<13.5	2.3	<78*	6.3	(e)
same	05/20/79	1.0	13.1	2.8	73*	5.9	(b)
same	06/21/79	0.9	6.3	1.5	26*	2.2	(c)
same	07/27/79	1.0	6.0	2.5	15	5.6	(d)
same	08/17/79	0.3	8.9	2.1	11*	5.4	(d)
same	09/05/79	0.3	8.0	1.4	7*	5.8	(d)
Middle Rosebud Creek/Colstrip	07/12/78	0.9	15.0	3.4	77*	3.4	(a)
same	08/22/78	0.7	26.0	1.7	45#	2.7	(c)
same	08/24/79	0.5	18.5	2.5	23	5.7	(d)
Lower Rosebud Creek/Rosebud	11/07/79	0.8	29.5	2.6	61	7.0	(d)
Indian Creek/Kirby	07/25/78	0.8	9.2	3.0	22	5.8	(b)
same	08/24/78	0.9	9.4	1.1	9	4.6	(c)
same	11/05/78	1.0	9.7	1.1	11	4.1	(c)
same	06/26/79	0.5	8.6	1.9	8	4.9	(d)
same	07/17/79	0.6	10.2	1.2	7	5.7	(d)
same	09/28/79	0.4	5.6	2.7	6	6.5	(d)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (a)high water channel; (b)high water riffle; (c)normal channel; (d)normal riffle; (e)near flood stage.

Table G135. Continued (the second page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Davis Creek/Busby	06/26/78	0.8	5.1	0.9	4	4.0	(a)
same	07/25/78	0.8	6.7	0.1	0.5	2.5	(c)
same	08/24/79	0.2	2.8	0.3	0.2	4.5	(c)
Muddy Creek/Busby-Lame Deer	06/26/78	1.1	48.6	1.1	25*	3.3	(b)
same	07/25/78	0.4	17.6	2.2	4*	2.6	(f)
same	05/20/79	0.8	30.2	1.4	6*	3.3	(c)
same	08/24/79	0.6	28.5	1.0	3*	4.7	(c)
Lame Deer Creek/Lame Deer	07/12/78	1.3	1.6	1.2	2	4.3	(c)
same	08/16/78	1.0	2.6	1.1	3	4.3	(c)
same	08/07/79	0.5	3.5	1.5	3	5.6	(d)
same	11/06/79	0.5	8.4	1.2	5	6.9	(d)
Tongue River/Sheridan-Decker	07/07/78	0.8	>40.0	2.5	740#	5.2	(b)
same	08/26/78	1.2	>40.0	3.0	130#	4.6	(c)
same	06/26/79	1.0	>40.0	3.1	370#	4.9	(a)
same	08/30/79	0.7	>40.0	2.9	90#	6.1	(d)
Ash Creek/Sheridan-Decker	06/10/78	0.6	5.7	2.7	9	3.5	(b)
same	07/26/79	0.4	2.8	1.0	1	5.0	(d)
same	08/30/79	0.2	3.2	1.5	1	4.9	(d)
Tongue River/Sheridan-Decker	07/13/79	0.9	7.7	2.2	15	6.2	(b)
same	08/30/79	0.7	5.6	1.3	5	4.1	(d)
Tongue River/Pyramid Butte-Birney	06/28/78	0.9	>40.0	1.4	3300#	3.3	(e)
same	07/19/78	0.8	>40.0	1.9	980#	6.4	(b)
same	08/03/78	1.5	>40.0	2.8	1040#	6.4	(b)
same	08/24/78	1.8	>40.0	2.5	590#	6.3	(c)
same	09/05/78	1.0	>40.0	1.5	360#	5.7	(d)
same	10/08/78	0.9	>40.0	1.8	260#	6.7	(d)
same	11/04/78	1.1	>40.0	3.3	130#	6.4	(d)
same	03/31/79	0.7	>40.0	0.7	270#	7.4	(c)
same	05/19/79	1.1	>40.0	1.2	510#	6.1	(d)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (a)high water channel; (b)high water riffle; (c)normal channel; (d)normal riffle; (e)near flood stage; (f)riffle to pool.

Table G135. Continued (the third page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Tongue River/Pyramid Butte-Birney	06/21/79	1.0	>40.0	2.1	500#	6.5	(d)
same	08/01/79	1.0	>40.0	1.7	490#	5.8	(d)
same	08/18/79	0.8	>40.0	1.5	480#	6.2	(d)
same	09/05/79	1.2	>40.0	2.3	470#	6.0	(c)
Squirrel Creek/Decker	06/10/78	0.8	25.1	4.4	18*	6.9	(b)
same	08/26/78	0.5	6.4	2.3	3*	5.0	(d)
same	04/01/79	0.5	19.8	2.9	22*	6.0	(b)
same	05/20/79	0.6	18.8	3.1	13#	5.7	(d)
same	06/21/79	0.6	22.4	1.1	5#	5.2	(f)
same	07/26/79	0.4	6.0	3.0	2#	5.6	(d)
same	08/17/79	0.3	8.1	2.1	2*	5.3	(d)
same	09/05/79	0.2	5.6	1.1	1	5.6	(d)
same	11/06/79	0.3	3.7	2.2	2	4.8	(d)
Deer Creek/Decker	06/10/78	0.4	1.9	1.1	0.8	3.8	(c)
same	08/15/78	0.3	1.6	1.1	0.5	2.9	(f)
same	11/05/79	0.2	1.5	1.1	0.3	2.7	(c)
Canyon Creek/Decker-Birney	06/26/79	0.1	1.0	2.5	0.3	4.7	(c)
same	07/27/79	0.7	4.1	1.1	2*	4.3	(d)
same	08/30/79	1.1	4.6	1.2	3*	4.3	(c)
Prairie Dog Creek/Pyramid Butte-Birney	07/12/79	0.3	4.6	0.8	1	5.3	(d)
same	08/30/79	0.3	1.7	0.6	0.3	6.1	(d)
Bull Creek/Pyramid Butte-Birney	07/12/79	0.3	5.4	0.6	1	5.8	(d)
same	08/30/79	0.4	4.6	1.5	2*	5.8	(d)
Cook Creek/Birney-Birney Village	06/11/78	0.6	6.8	0.8	3	3.1	(c)
same	08/24/78	0.3	3.7	1.1	1	2.4	(c)
same	09/05/79	0.1	0.7	0.8	0.1	5.5	(d)
Logging Creek/Ashland	06/27/78	0.3	1.4	0.9	0.4	2.5	(c)
same	08/16/78	0.8	3.8	0.5	1*	2.8	(c)
same	09/06/79	0.4	1.0	1.1	0.4	3.8	(c)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (b)high water riffle; (c)normal channel; (d)normal riffle; (f)riffle to pool.

Table G135. Continued (the fourth page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Beaver Creek/Brandenberg	07/13/78	0.5	5.1	1.8	5	6.8	(f)
same	09/03/78	0.3	5.9	1.1	2	5.6	(d)
same	10/09/78	0.5	18.7	3.1	16*	4.3	(b)
same	07/12/79	0.2	2.6	1.1	0.6	4.8	(d)
same	08/24/79	0.3	3.6	0.6	0.6	4.9	(c)
Upper Hanging Woman Creek/Quietus-Decker	06/16/78	0.7	20.6	2.0	14*	6.7	(b)
same	06/28/78	0.6	22.2	0.6	3*	5.4	(f)
same	07/18/78	0.3	24.3	0.3	0.8*	6.1	(f)
same	08/15/78	0.3	2.4	1.8	1	5.8	(d)
same	08/28/78	0.3	3.9	1.1	1	6.4	(d)
same	09/05/78	0.2	10.2	0.8	0.6*	6.3	(d)
same	10/07/78	0.3	5.5	1.6	1*	4.1	(d)
same	11/04/78	0.3	5.9	1.9	1*	4.4	(d)
same	05/19/79	0.4	4.2	1.9	3	6.2	(d)
same	06/21/79	0.6	4.1	0.6	1	5.9	(c)
same	07/27/79	0.4	2.5	1.0	1	5.4	(d)
same	08/17/79	0.2	5.4	1.2	1	5.2	(d)
same	09/04/79	0.2	2.7	0.9	0.5	6.0	(d)
same	09/14/79	0.4	2.8	1.3	1	5.8	(d)
Lower Hanging Woman Creek/Birney	06/16/78	1.8	18.8	0.5	17	5.2	(a)
same	06/29/78	0.6	24.7	0.9	8*	5.8	(f)
same	07/19/78	0.5	5.9	2.0	3*	5.9	(d)
same	08/15/78	0.5	8.2	2.0	2*	5.6	(d)
same	09/05/78	0.3	6.3	2.2	1#	5.0	(d)
same	10/07/78	0.4	5.9	1.4	1*	6.4	(d)
same	11/04/78	0.4	3.2	1.9	2	5.8	(d)
same	02/11/79	0.7	--	2.8	3#	5.9	(g)
same	03/31/79	0.5	6.2	1.7	5	5.4	(d)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (a)high water channel; (b)high water riffle; (c)normal channel; (d)normal riffle; (f)riffle to pool; (g)riffle under ice.

Table G135. Continued (the fifth page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Lower Hanging Woman Creek/Birney	05/19/79	0.7	9.7	1.3	5*	5.6	(d)
same	06/22/79	0.7	6.3	1.3	3#	6.6	(d)
same	07/28/79	0.5	5.1	2.0	2#	5.5	(d)
same	08/18/79	0.3	8.2	3.8	2*	6.4	(d)
same	09/14/79i	0.2	3.2	1.7	1	6.3	(d)
same	09/14/79j	0.3	3.4	1.3	1	6.3	(d)
same	09/15/79k	0.4	3.4	1.7	2	5.8	(d)
East Fork of Hanging Woman Creek/Birney	06/11/78	0.4	1.7	2.1	1	4.5	(d)
same	08/18/78	0.3	4.7	1.4	2	5.4	(d)
same	10/08/78	0.4	5.9	1.3	2*	4.6	(d)
same	11/04/78	0.4	11.7	1.0	2*	4.7	(c)
same	02/11/79	0.2	3.0	1.4	0.8	5.2	(g)
same	03/31/79	0.5	5.3	0.3	0.8	5.8	(c)
same	05/19/79	0.5	2.4	0.9	1	3.9	(d)
same	06/22/79	0.3	3.2	1.1	1	4.9	(d)
same	07/28/79	0.4	2.2	2.1	2	4.9	(d)
same	08/20/79	0.3	3.1	1.0	0.9	6.0	(d)
same	09/05/79	0.2	2.6	1.8	0.9	5.6	(d)
Bear Creek/Otter	07/12/79	0.3	11.2	0.8	1*	5.8	(f)
same	08/23/79	0.2	3.4	0.7	0.5	4.7	(c)
same	09/30/79	0.2	3.8	0.7	0.5	7.1	(d)
Upper Otter Creek/Otter-Fort Howe	07/07/78	0.8	4.7	1.1	4	5.0	(c)
same	08/29/78	0.3	5.8	1.0	2	3.9	(c)
same	06/27/79	0.5	6.3	2.1	4*	3.4	(f)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (c)normal channel; (d)normal riffle; (f)riffle to pool; (g)riffle under ice.

i--Collected at T07S,R43E,17C (upstream and intermediate sampling site).
j--Collected at T06S,R43E,19O (major downstream sampling site).
k--Collected at T06S,R43E,18B (sampling site near mouth).

Table G135. Continued (the sixth page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Upper Otter Creek/Otter-Fort Howe	07/31/79	0.5	4.9	2.1	5	4.9	(d)
same	08/31/79	0.5	1.7	1.9	2	5.8	(d)
same	09/30/791	0.2	0.6	1.4	0.2	5.9	(d)
same	09/30/79m	0.5	2.8	0.8	1	6.3	(d)
Cow Creek/Otter-Fort Howe	07/31/79	0.2	2.2	1.0	0.4	5.4	(d)
same	08/31/79	0.2	2.2	1.2	0.5	6.3	(d)
Lower Otter Creek/Ashland	06/15/78	0.4	17.5	0.8	14*	5.6	(a)
same	07/05/78	0.5	16.4	2.8	11*	4.2	(b)
same	07/21/78	0.4	17.3	2.0	7*	4.7	(d)
same	07/31/78	0.8	7.4	2.4	6*	5.6	(c)
same	09/04/78	0.7	6.9	2.5	4*	5.5	(c)
same	10/08/78	0.9	15.2	1.6	6*	4.4	(c)
same	11/05/78	0.6	13.4	2.7	3*	5.4	(d)
same	02/11/79	0.7	--	2.0	5#	6.0	(h)
same	03/31/79	1.5	9.4	1.8	25	5.7	(a)
same	05/20/79	0.7	13.7	1.2	11	5.2	(b)
same	06/20/79	0.5	15.6	2.5	6*	5.3	(d)
same	07/28/79	0.7	9.6	1.2	4*	5.5	(c)
same	08/18/79	0.4	12.2	1.4	3*	5.9	(d)
same	09/30/79n	0.8	9.7	0.8	3*	6.9	(c)
same	09/30/79o	0.4	11.5	1.7	2*	5.4	(d)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (a)high water channel; (b)high water riffle; (c)normal channel; (d)normal riffle; (h)channel under ice.

1--Collected at T08S,R46E,05C (upstream sampling site above Bear Creek).
m--Collected at T07S,R45E,13D (major upstream sampling site).

n--Collected at T05S,R45E,11C (upstream and intermediate sampling site).
o--Collected at T03S,R44E,12C (major downstream sampling site).

Table G135. Continued (the seventh page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Pumpkin Creek/Miles City	06/15/78	2.7	>35.0	<0.1	12#	1.4	(p)
same	07/05/78	0.9	14.1	2.9	37	5.3	(b)
same	07/21/78	0.6	28.3	2.2	37	5.9	(b)
same	07/31/78	0.3	10.9	1.1	1*	4.9	(d)
same	09/06/78	0.1	6.7	0.5	0.3	5.0	(d)
same	10/09/78	0.1	7.2	1.2	0.1#	5.1	(d)
same	05/12/79	0.5	37.0	0.8	15	5.2	(a)
same	08/09/79	<0.1	18.9	<0.1	<0.1	5.0	(d)
Mizpah Creek/Mizpah	06/15/78	0.8	17.6	2.8	12#	5.5	(b)
same	07/05/78	0.9	20.8	2.9	72*	5.6	(e)
same	07/21/78	0.4	13.4	1.5	20*	4.8	(b)
same	07/31/78	0.7	27.6	2.4	46	5.3	(b)
same	09/06/78	0.1	1.2	0.5	0.1	5.7	(d)
same	10/09/78	<0.1	4.4	1.1	0.2#	4.4	(d)
same	05/12/79	0.6	18.9	1.6	18	5.1	(b)
same	08/09/79	0.1	6.0	0.2	0.8	5.9	(d)
West Fork of Armells Creek/Colstrip	05/28/78	1.1	5.6	1.9	12	2.7	(a)
same	07/03/79	0.2	0.9	0.3	0.1	2.4	(c)
Lower Armells Creek/Forsyth	07/03/79	0.3	7.4	0.5	1	4.0	(f)
same	08/22/79	0.2	2.6	0.2	0.1	5.1	(d)
same	11/07/79	0.3	5.4	0.9	0.7*	5.5	(d)
Sweeney Creek/Rosebud	05/28/78	0.6	7.4	1.4	6	5.2	(b)
same	07/12/78	0.6	5.0	0.8	2	5.6	(c)
same	05/13/79	0.5	9.4	1.9	4*	6.4	(b)
same	08/21/79	0.3	4.5	0.5	0.7	6.3	(d)
Reservation Creek/Forsyth	05/28/78	0.9	4.4	2.5	10	2.6	(a)
same	07/12/78	0.6	3.7	0.3	0.3*	2.7	(c)
same	08/22/78	0.4	4.4	1.3	1*	4.2	(c)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (a)high water channel; (b)high water riffle; (c)normal channel; (d) normal riffle; (e)near flood stage; (f)riffle to pool; (p)high water--water from the Tongue River backed up to the tributary sampling point.

Table G135. Continued (the eighth page of eight pages).

Sampling Station	Collection Date	Sampling Point Depth	Stream Width	Sampling Point Velocity	Estimated Flow	Substrate Reference Number	Notes
Reservation Creek/Forsyth	05/13/79	0.8	24.4	3.5	4*	5.9	(c)
same	08/22/79	0.4	2.6	0.8	0.8	2.9	(c)
Sarpy Creek/Hysham	07/12/78	0.5	13.6	1.7	2#	5.5	(d)
same	08/22/78	0.3	5.1	2.0	0.6*	5.4	(d)
same	05/13/79	0.8	14.6	2.6	18*	5.8	(a)
same	08/22/79	0.9	7.7	0.3	2	2.1	(c)
Powder River/Moorhead	09/14/79	0.5	>20.0	2.6	150#	7.3	(d)
Powder River/Mizpah	08/09/79	0.4	>20.0	1.0	--	4.6	(d)
Miscellaneous Physical Measurements and Site Visitations							
Middle Rosebud Creek/Colstrip	07/03/79	>4.0	>10.0	1.6	>60	--	(q)
David Creek/Busby	08/22/79	--	--	--	<0.1	--	(r)
Youngs Creek/Sheridan-Decker	07/26/78	--	--	--	--	--	(s)
Deer Creek/Decker	07/27/79	--	--	--	0	--	(r)
Prairie Dog Creek/Pyramid Butte-Birney	09/05/79	<0.1	<0.6	<1.0	<0.1	--	(r)
Cook Creek/Birney-Birney Village	06/27/79	<0.1	0.4	<1.0	<0.1	--	(r)
Logging Creek/Ashland	06/27/79	--	--	--	0	--	(r)
Logging Creek/Ashland	07/28/79	0.2	1.5	0.9	0.3	--	(t)
Beaver Creek/Brandenberg	11/05/78	0.3	8.3	0	0	--	(r,t)
Lower Hanging Woman Creek/Birney	08/28/78	0.5	3.8	1.9	1*	--	(d,u)
Lower Hanging Woman Creek/Birney	09/04/79	0.3	4.6	1.5	2	--	(d,u)
Cow Creek/Otter-Fort Howe	06/27/79	0.3	2.8	1.4	1	--	(d,s)
Lower Otter Creek/Ashland	09/04/79	0.4	13.0	2.3	3*	--	(d,u)
Pumpkin Creek/Miles City	02/10/79	--	--	--	0	--	(v)
Mizpah Creek/Mizpah	02/10/79	--	--	--	0	--	(v)
West Fork of Armells Creek/Colstrip	07/12/78	4.0	>15.0	<0.1	--	--	(q)
Sarpy Creek/Hysham	05/27/78	2.7	11.0	--	44#	--	(q)

*Flow estimate based on additional measurements; #flow estimate made from USGS records; (a)high water channel; (c)normal channel; (d)normal riffle; (q)water level too high to obtain a valid Surber sample; (r)riffle dry or possessing an inadequate flow to obtain a valid Surber sample; (s)preliminary site inspection; (t)stream sterile and lacking macroinvertebrates; (u)Surber collection not analyzed; (v)stream frozen.

Table G136. Physical measurements taken in association with the jumbo multiplate benthic macroinvertebrate collections with exposure time in days, with depth to the sampler and stream width in feet, and with stream velocity at the sampler in feet per second (the first page of four pages).

Sampling Station	Collection Date	Habitat	Exposure Period	Mean Sampler Depth	Mean Stream Width	Mean Stream Velocity at Sampler
Upper Rosebud Creek/Kirby	09/05/78	Riffle	48.9	0.7	7.6	2.6
same	09/05/78	R to P*	48.9	1.0	8.2	1.4
same	09/05/78	Pool	48.9	1.4	9.3	0.1
same	10/08/78	Riffle	33.1	0.8	7.7	2.5
same	10/08/78	R to P*	33.1	1.3	7.8	1.0
same	10/08/78	Pool	33.1	1.9	11.6	0.1
same	09/15/79	Riffle	50.1	0.5	8.7	2.8
same	09/15/79	R to P*	50.1	2.0	10.4	0.7
same	09/15/79	Pool	50.1	2.2	15.6	0.1
same	11/06/79	Riffle	51.9	0.6	8.1	2.7
same	11/06/79	R to P*	51.9	1.8	10.8	0.8
same	11/06/79	Pool	51.9	2.1	15.2	0.2
Tongue River/Pyramid Butte-Birney	09/05/78	R to P*	32.7a	1.5 to 0.4	>40.0	1.5 to 0.2
same	10/08/78	Riffle	33.4	0.6	>40.0	2.2
same	10/08/78	Pool	33.4	1.7	>40.0	0.6
same	09/15/79	Riffle	44.8b	0.9	>40.0	1.7
same	09/15/79	R to P*	44.8b	1.7	>40.0	0.9
same	09/15/79	Pool	44.8b	2.2	>40.0	0.5
same	11/05/79	R to P*	51.2a	1.8 to 1.0	>40.0	0.7 to 0.0
same	11/05/79	Pool	51.2a	2.2 to 1.6	>40.0	0.5 to 0.3
Squirrel Creek/Decker	09/15/79	Riffle	50.8	0.5	6.4	2.3
same	09/15/79	R to P*	50.8	1.8	5.7	0.6
same	09/15/79	Pool	50.8	1.2	10.6	0.0
same	11/06/79	Riffle	51.8	0.4	6.9	2.3
same	11/06/79	R to P*	51.8	1.8	6.0	0.8
same	11/06/79	Pool	51.8	1.1	9.4	0.0

*Riffle to pool. a--These distinctive changes in the physical measurements were caused by a marked drop in river state during the exposure period. b--Samplers were found smothered with large quantities of macroalgae and macrophytes during this exposure period.

Table G136. Continued (the second page of four pages).

Sampling Station	Collection Date	Habitat	Exposure Period	Mean Sampler Depth	Mean Stream Width	Mean Stream Velocity at Sampler
Upper Hanging Woman Creek/Quietus-Decker	09/05/78	Riffle	49.2	0.3	8.8	1.9
same	09/05/78	R to P*	49.2	0.5	16.8	0.7
same	09/05/78	Pool	49.2	1.5	19.8	<0.1
same	10/07/78	R to P*	32.1	0.5	16.4	0.3
same	10/07/78	Pool	32.1	1.2	12.6	0.0
same	09/14/79	Riffle	48.9	0.4	2.8	1.1
same	09/14/79	R to P*	48.9	0.5	6.1	0.2
same	09/14/79	Pool	48.9	2.2	12.3	<0.1
same	11/05/79	Riffle	51.8	0.3	2.2	1.1
same	11/05/79	R to P*	51.8	0.4	5.7	0.3
same	11/05/79	Pool	51.8	2.2	12.0	0.0
Lower Hanging Woman Creek/Birney	09/09/78	Riffle	22.0	0.5	7.4	2.1
same	09/09/78	R to P*	22.0	1.2	8.4	0.5
same	09/09/78	Pool	22.0	2.8	12.5	0.0
same	10/07/78	Riffle	28.1	0.4	6.4	1.7
same	10/07/78	R to P*	28.1	1.1	8.3	0.3
same	10/07/78	Pool	28.1	2.8	12.5	0.0
same	09/14/79	Riffle	48.4	0.4	4.4	1.8
same	09/14/79	R to P*	45.4	1.3	16.0	0.5
same	09/14/79	Pool	45.4	1.8	16.3	0.0
same	11/05/79	Riffle	51.7	0.4	4.9	1.8
same	11/05/79	R to P*	51.7	1.0	8.6	0.4
same	11/05/79	Pool	51.7	1.7	15.3	0.0
East Fork of Hanging Woman Creek/Birney	09/29/79	Riffle	63.2	0.4	2.6	0.9
same	09/29/79	R to P*	63.2	0.5	2.4	0.3
same	09/29/79	Pool	63.2	1.1	7.7	0.0
same	11/05/79	Riffle	37.0	0.5	2.8	1.0
same	11/05/79	R to P*	37.0	0.6	3.0	0.3
same	11/05/79	Pool	37.0	1.0	7.7	0.0

*Riffle to pool.

Table G136. Continued (the third page of four pages).

Sampling Station	Collection Date	Habitat	Exposure Period	Mean Sampler Depth	Mean Stream Width	Mean Stream Velocity at Sampler
Lower Otter Creek/Ashland	09/04/78	Riffle	34.7	0.5	13.4	1.7
same	09/04/78	R to P*	34.7	0.8	13.1	0.7
same	09/04/78	Pool	34.7	1.0	14.3	0.2
same	10/08/78	Riffle	34.1c	0.5 to 1.0	--	1.7 to 0.7
same	10/08/78	R to P*	34.1	1.1	17.8	0.4
same	10/08/78	Pool	34.1	1.6	17.7	0.0
same	09/29/79	Riffle	63.2	0.6	9.4	1.2
same	09/29/79	R to P*	63.2	0.8	15.9	0.5
same	09/29/79	Pool	63.2	1.6	16.5	0.1
same	11/06/79	Riffle	38.0	0.7	9.6	1.5
same	11/06/79	R to P*	38.0	0.9	16.0	0.4
same	11/06/79	Pool	38.0	1.7	16.4	0.1
Pumpkin Creek/Miles City	09/06/78	R to P*	17.9	0.6	4.3	0.7
same	09/06/78	Pool	17.9	1.7	8.2	0.0
same	10/09/78	R to P*	33.1	0.4	3.9	0.6
same	10/09/78	Pool	33.1	1.2	8.1	0.0
Mizpah Creek/Mizpah	09/06/78	Riffle	18.0	0.6	3.0	1.3
same	09/06/78	R to P*	18.0	1.0	4.6	0.5
same	09/06/78	Pool	18.0	1.3	7.5	<0.1
same	10/09/78	Riffle	33.0	0.7	2.6	1.2
same	10/09/78	Pool	33.0	1.2	6.8	<0.1

Related Site Visitations and Notes		
Upper Rosebud Creek/Kirby	07/18/78	Initial installation of samplers for the 1978 season.
same	08/03/78	Initial physical measurements for the first exposure.
same	07/27/79	Initial installation of samplers for the 1979 season.
same	08/08/79	Checked samplers after a storm and runoff event.

*Riffle to pool. c--These distinctive changes in physical measurements were caused by the development of a beaver dam in the riffle section; the samplers could not be located and retrieved.

Table G136. Continued (the fourth page of four pages).

Sampling Station	Visitation Date	Related Site Visitations and Notes
Tongue River/Pyramid Butte-Birney	08/03/78	Initial installation of samplers for the 1978 season.
same	07/30/79	Stream too high to install the 1979 samplers.
same	08/01/79	Initial installation of samplers for the 1979 season.
same	08/08/79	Checked samplers after a storm and runoff event.
same	09/29/79	Checked samplers for macroalgae-macrophyte smothering.
Squirrel Creek/Decker	07/26/79	Initial installation of samplers for the 1979 season.
Upper Hanging Woman Creek/Quietus-Decker	07/18/78	Initial installation of samplers for the 1978 season.
same	08/15/78	Initial physical measurements for the first exposure.
same	07/27/79	Initial installation of samplers for the 1979 season.
same	07/31/79	Checked samplers after a storm and runoff event.
Lower Hanging Woman Creek/Birney	08/18/78d	Initial installation of samplers for the 1978 season.
same	07/28/79	Initial installation of samplers for the 1979 season.
same	07/30/79	Riffle to pool and pool samplers washed-out by run-off from a severe storm on this date.
same		
same	07/31/79	Reinstallation of riffle to pool and pool samplers.
East Fork of Hanging Woman Creek/Birney	07/28/79	Initial installation of samplers for the 1979 season.
same	08/07/79	Checked samplers after storm and runoff event.
Lower Otter Creek/Ashland	07/31/78	Initial installation of samplers for the 1978 season.
same	07/28/79	Initial installation of samplers for the 1979 season.
Pumpkin Creek/Miles City	07/21/78	Initial installation of samplers for the 1978 season.
same	07/31/78	Initial physical measurements for the first exposure.
same	08/19/78	Samplers out of water and moved to new locations.
Mizpah Creek/Mizpah	07/21/78	Stream too high to install the 1978 samplers
same	07/31/78	Initial installation of samplers for the 1978 season.
same	08/19/78	Samplers out of water and moved to new locations.

d--The first installation of samplers at this station was delayed to some extent for the 1978 season because an inadequate number of samplers were initially available to the study.

Table H137. Taxa list, associated systematics, and major characteristics of algae collected from streams draining the southern Fort Union region in southweastern Montana (the first page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
PROKARYOTA (Monera): fission plants.....	Prokaryotic cells lacking distinct organelles; includes the bacteria and the blue-green algae.
D. Cyanophyta (Schizophyta): blue-green algae...	Photosynthetic pigments, including chlorophyll a, present but not located in definite chloroplasts; color variable.
C. Cyanophyceae (Schizophyceae or Myxophyceae)	
O. Chroococcales.....	Cells solitary or in loose colonies; rarely filamentous.
F. Chroococcaceae.....	Thallus with a colonial organization.
Chroococcus.....	Colonies of a nondistinctive shape but with an obvious and colorless sheath.
O. Oscillatoriales.....	Thallus with a distinctly filamentous organization.
SO-F. Oscillatorineae--Oscillatoriaceae....	Uniseriate unbranched trichomes lacking heterocysts.
Oscillatoria.....	Trichomes not regularly spiraled and lacking a sheath.
Spirulina.....	Trichomes regularly spiraled and lacking a sheath.
Phormidium.....	Sheaths present but watery with filaments interwoven.
Trichodesmium.....	Sheaths present but watery with filaments parallel.
Lyngbya.....	Sheaths present but firm, colorless to brown.
SO. Nostochineae.....	Variously organized trichomes possessing heterocysts.
F. Nostocaceae.....	Unbranched trichomes lacking attenuation to the apices.
Nostoc.....	Thallus having a definite form.
Aulosira.....	Thallus amorphous with firm and thin sheaths.
Anabaena.....	Thallus amorphous with watery and broad sheaths.
F. Scytonemataceae.....	Falsely branched trichomes lacking a distinct attenuation.
Tolypothrix.....	False branching single and abundant.
F. Rivulariaceae.....	Variously branched trichomes having a sharp attenuation.
Rivularia.....	Filaments united to form rounded colonies.
Calothrix.....	Filaments not forming rounded colonies.
EUKARYOTA: higher plants and animals.....	Eukaryotic cells possessing distinct organelles.
Photosynthetic protista: "true" algae.....	Photosynthetic pigments, including chlorophyll a, present and located in definite chloroplasts.

*D--division (phyla), C--class, O--order, SO--suborder, and F--family; genera are also listed.

Table H137. Continued (the second page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
Photosynthetic protista (continued)	
D-C. Rhodophyta--Rhodophyceae: red algae.....	Multicellular thallus tending to a red coloration because of the predominance of phycoerythrin pigments; freshwater forms greyish-green; chlorophyll d also present.
SC-O. Florideae--Nemalionales.....	Relatively complex thallus growing from apical cells.
F. Chantransiaceae.....	Microscopic and freely branched filamentous thallus lacking a distinct central axis.
Audouinella: freshwater red algae	
D-C. Euglenophyta--Euglenophyceae: euglenoids...	Pigmented or unpigmented and typically unicellular motile flagellates lacking a cell wall; chlorophyll b also present with lipid and paramylum storage.
O. Euglenales.....	Flagellated motile cell dominant phase of life cycle.
F. Euglenaceae.....	Eyespot present.
Euglena: euglena.....	Cells plastic and lacking a lorica; grass-green in color.
Trachelomonas.....	Protoplast surrounded by a lorica.
D. Chlorophyta: grass-green algae.....	Cellulose cell wall, starch storage, and green pigmentation; chlorophyll b also present.
C-O. Charophyceae--Charales: stonewarts.....	Erect and branched thallus with nodes and internodes.
F. Characeae.....	Includes all present-day members; complex thallus.
Chara.....	Rather pronounced musky odor.
C. Chlorophyceae.....	"Catch-all" group with highly variable morphologies but lacking unique reproductive modes; typically uninucleate.
O. Volvocales: e.g., volvox #.....	Flagellated motile vegetative cells dominate life cycle.
O. Tetrasporales.....	Nonfilamentous, non-flagellated gelatinous colonies with cells that divide vegetatively.
F. Palmellaceae.....	Small amorphous colonies.
Sphaerocystis.....	Colonies somewhat spherical with few cells.
O. Chlorococcales.....	Non-flagellated unicellular or nonfilamentous colonies of definite shape and cells that do not divide vegetatively.
F. Hydrodictyaceae.....	Flagellate coenobial colony formation.
Pediastrum.....	Many-celled coenobium with all cells in the same plane.

*D--division (phyla), C--class, SC--subclass, O--order, and F--family; genera are also listed.
#Genera of this order were not identified in any of the macroalgae-periphyton samples.

Table H137. Continued (the third page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
D-C. Chlorophyta--Chlorophyceae (continued)	
O. Chlorococcales (continued)	
F. Coelastraceae	Radially arranged cells in a somewhat globose coenobium.
Coelastrum	Coenobium a hollow sphere of four to 128 cells.
F. Oocystaceae	Variable morphologies; colonies lacking a cellular orientation; reproduction by autospores.
Planktosphaeria	Spherical cells embedded in a wide homogenous envelope.
Ankistrodesmus	Spindle-shaped and loosely aggregated cells.
F. Scenedesmaceae	Reproduction by autospores and colonies possessing a definite cellular orientation.
Scenedesmus	Colonies a flat plate of elongated and parallel cells.
O. Ulotrichales	Filamentous with a single laminate parietal chloroplast.
F. Ulotrichaceae	Unbranched filaments lacking H-pieces.
Hormidium	Filament without a basal cell.
Ulothrix	Filament with a basal cell.
F. Microsporaceae	Unbranched filaments possessing H-pieces.
Microspora	Only genus for this family.
F. Chaetophoraceae	Branched filaments lacking seta; relatively complex.
Microthamnion	Ends of branches not pointed.
Chaetophora	Ends of branches pointed; thallus having a definite shape.
Stigeoclonium	Ends of branches pointed; thallus lacking a definite shape.
O. Ulvales	Cubical cells united laterally to form sheets, tubes, or cylinders; single laminate or cup-shaped chloroplast.
F. Ulvaceae	Thallus a sheet, ribbon, or hollow tube.
Enteromorpha	Mature thallus a hollow tube.
Monostroma	Mature thallus an expanded sheet.
F. Schizomeridaceae	Thallus a solid cylinder of brick-like cells.
Schizomeris	Only genus for this family.

*D--division (phyla), C--class, O--order, and F--family; genera are also listed.

Table H137. Continued (the fourth page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
D. Chlorophyta (continued)	
C. Oedogoniophyceae	Filamentous with cells much longer than broad; a unique type of cell division; only one order in this class.
O. Oedogoniales	
F. Oedogoniaceae	Only family for this order.
Oedogonium	Unbranched filaments.
C. Bryopsidophyceae	Macroscopic with multinucleate siphons or cells.
O. Cladophorales: river "moss"	Simple or branched filaments with multinucleate cells.
F. Cladophoraceae	Only family for this order.
Cladophora	Filaments freely branched and branches distinct.
Rhizoclonium	Filaments sparsely branched and branches short.
O. Siphonales #	Thallus a single but extensive multinucleate cell (siphon).
C. Conjugatophyceae	Complex chloroplasts; reproduces by conjugation.
O-F. Desmidiales--Desmidiaceae; desmids	Cells formed into two hemicells joined by an isthmus.
Pleurotaenium	Cells united in unbranched filaments.
Cosmarium	Cells solitary with a median constriction.
Closterium	Cells solitary without a median constriction.
O. Zygnematales: pond scum	Filamentous and lacking hemicells.
F. Zygnemataceae	Cylindrical cells united in unbranched filaments.
Zygnema	Cells with two stellate chloroplasts.
Mougeotia	Cells with a single axial and laminate chloroplast.
Spirogyra	Cells with one or more spiral chloroplasts.
D. Pyrrophyta: golden-brown algae	Typically unicellular biflagellates (two flagella differ); chlorophyll c also present; lipid and starch storage.
C. Dinophyceae: dinoflagellates	Cells encircled by a transverse or spiral groove.
O. Peridinales	Cell walls composed of definitely arranged plates.
F. Peridiniaceae	Thick walls with two antapical plates; horns absent.
Peridinium	Country's only freshwater genus for this family.
F. Ceratiaceae	Thick walls with distinct horns evident.
Ceratium	Country's only freshwater genus for this family.

*D--division (phyla), C--class, O--order, and F--family; genera are also listed.
#Genera of this order were not identified in any of the macroalgae-periphyton samples.

Table H137. Continued (the fifth page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
Photosynthetic protista (continued)	
D. Chrysophyta: yellow-green algae.....	Preponderance of carotenoid pigments; starch never a storage product; pectin cell membranes in two overlapping pieces and frequently impregnated with silica.
C. Xanthophyceae.....	Yellow-green coloration; chlorophyll e also present; leucosin and some oils are major storage products; two halves of cell wall and silica impregnation not obvious.
O. Heterotrichales.....	Cylindrical cells united end to end to form filaments.
F. Tribonemataceae.....	Unbranched filaments.
Tribonema.....	Thick cell walls with H-pieces clearly evident.
O. Heterosiphonales.....	Multinucleate and siphonaceous cells.
F. Vaucheriaceae.....	Filamentous.
Vaucheria.....	Only genus for this family.
C. Chrysophyceae.....	Golden-brown coloration; chlorophylls b-e missing; leucosin and oils are major storage products; two halves of cell wall not obvious but often containing silica.
O. Chrysomonadales.....	Motile during vegetative phase of life cycle.
F. Ochromonadaceae.....	Biflagellated forms with flagella of unequal length.
Dinobryon.....	Cells with a lorica in free-swimming dendroid colonies.
C. Bacillariophyceae: diatoms.....	Brown coloration; chlorophyll c also present; oils are the major storage product; sculptured silica cell wall (frustule) as two distinct halves (valves).
O. Centrales: centric diatoms.....	Non-motile cells with valves circular, polygonal, or irregular in outline; ornamentation radial or concentric about a central point; raphe-pseudoraphe missing.
SO. Coscinodiscineae.....	Discoid or cylindrical cells lacking horn-like processes.
F. Coscinodiscaceae.....	Discoid cells ornamental pattern not in distinct sectors.
Melosira spp.....	Cells united in long filaments.
Melosira varians	
Stephanodiscus spp.....	Cells solitary; valve surface with radiate hyaline areas.
Stephanodiscus subtilis	

*D--division (phyla), C--class, O--order, SO--suborder, and F--family; genera and major diatom species are also listed.

Table H137. Continued (the sixth page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
D-C. Chrysophyta--Bacillariophyceae (continued)	
O-F. Centrales--Coscinodiscaceae (continued)	
Cyclotella spp.	Cells solitary; two unlike concentric patterns evident.
Cyclotella glomerata	
Cyclotella meneghiniana	
SO. Biddulphineae	Generally zygomorphic cells posessing horn-like processes.
F. Chaetoceraceae	Frustules rounded; spine-like horns present.
Chaetoceros sp.	Frustules without intercalary bonds.
F. Biddulphiaceae	Frustules angled; stout horns present.
Biddulphia sp.	Country's only freshwater genus for this family.
O. Pennales: pennate diatoms	Cells often elongate; ornamentation bilaterally arranged to a sagital line and never with reference to a central point; raphe-pseudoraphe present.
SO. Fragilarineae	Pseudoraphe or primitive raphe on both valves.
F. Meridionaceae	Internal septa typically present; valves cuneate to form fan-shaped or spiral colonies or filaments.
Meridion sp.	Only freshwater genus for this family.
F. Diatomaceae	Internal septa present but valves bilaterally symmetrical.
Opephora sp.	Girdle view cuneate.
Diatoma spp.	Girdle view rectangular.
Diatoma tenue	
Diatoma vulgare	
F. Fragilariaceae	Valves typically symmetrical but lacking internal septa.
Asterionella sp.	Ends of valves dissimilar in size.
Fragilaria spp.	Valve ends similar; filamentous or stellate colonies.
Fragilaria capucina	
Fragilaria crotonensis	
Fragilaria vaucheriae	

*D--division (phyla), C--class, O--order, SO--suborder, and F--family; genera and major diatom species are also listed.

Table H137. Continued (the seventh page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
D-C. Chrysophyta--Bacillariophyceae (continued)	
O-F. Centrales--Fragilariaceae (continued)	
Synedra spp.	Valve ends similar; cells solitary or in radiate colonies.
Synedra famelica	
Synedra fasciculata	
Synedra ulna	
F. Eunotiaceae	Arcuate (curved) valves lacking internal septa.
Eunotia sp.	Valve ends similar; concave side not tumid in center.
SO. Achnanthineae	Pseudoraphe on one valve and true raphe on the other.
F. Achnanthaceae	Only family for this suborder.
Rhoicosphenia curvata	Frustules cuneate in girdle view.
Achnanthes spp.	Frustules not cuneate; long axis curved.
Achnanthes lanceolata	
Achnanthes minutissima	
Cocconeis spp.	Frustules not cuneate; transverse axis curved.
Cocconeis pediculus	
Cocconeis placentula	
SO. Naviculineae	Axial true raphe on both valves and not in keel.
F. Naviculaceae	Valves symmetrical and both valves alike.
Mastogloia spp.	Frustules internally septate.
Caloneis spp.	Remaining genera of this family not internally septate; these genera separated on the basis of various differences in frustule ornamentation and organization.
Diploneis spp.	
Diploneis puella	
Pleurosigma delicatulum	
Gyrosigma spp.	
Amphipleura pellucida	
Frustulia spp.	
Stauroneis spp.	
Pinnularia spp.	
Anomoeoneis spp.	
F. Naviculaceae (continued)	
Navicula spp.	
Navicula cincta	
Navicula cryptocephala	
Navicula gregaria	
Navicula odiosa	
F. Naviculaceae (continued)	
Navicula pavillardii	
Navicula radiosa	
Navicula symmetrica	
Navicula tripunctata	
Navicula viridula	

*D--division (Phyla), C--class, O--order, SO--suborder, and F--family; genera and major diatom species are also listed.

Table H137. Continued (the eighth page of eight pages).

Systematic Features and Scientific: Common Names*	Morphological and Other Aspects
C-SO. Bacillariophyceae--Naviculineae (continued)	
F. Gomphonemataceae.....	Valves transversely assymetrical.
Gomphoneis spp.....	Longitudinal lines adjoining valve margin.
Gomphonema spp.....	Longitudinal lines not adjoining valve margin.
Gomphonema angustatum	
Gomphonema olivaceum	
Gomphonema tenellum	
F. Cymbellaceae.....	Valves longitudinally assymetrical.
Epithemia spp.....	Valves with transverse costae; raphe acute-angled.
Epithemia sorex	
Rhopalodia spp.....	Valves with transverse costae; raphe not acute-angled.
Cymbella spp.....	Valves flat and without transverse costae.
Cymbella affinis	
Cymbella cymbiformis	
Cymbella microcephala	
Cymbella pusilla	
Amphora spp.....	Valves convex and without transverse costae.
Amphora perpusilla	
Amphora veneta	
SO. Surirellineae.....	True raphe on both valves but concealed in a keel.
F. Surirellaceae.....	Raphe in a marginal position on both margins of a valve.
Cymatopleura spp.....	Face of valve transversely undulate.
Surirella spp.....	Face of valve not transversely undulate and flat or spiral.
Surirella ovata	
F. Nitzschiaceae.....	Single excentric keel next to one lateral valve margin.
Denticula spp.....	Frustules with transverse septa.
Hantzschia sp.....	Frustules without transverse septa; raphes opposite.
Nitzschia spp.....	Frustules without transverse septa; raphes diagonally opposite.
Nitzschia acicularis, N. amphibia, Nitzschia communis, N. dissipata, Nitzschia filiformis, N. frustulum, N. kutzingiana, N. linearis, N. longissima, Nitzschia microcephala, N. palea, N. paleacea, N. valdestriata	

*C--class, SO--suborder, and F--family; genera and major diatom species are also listed.

Table I138. Periphyton community data and major algal taxa obtained from natural substrates collected from upper Rosebud Creek near Kirby and from an unnamed pond near Kirby (the first page of three pages).

	Upper Rosebud Creek					
Collection Date	6/16/78	6/29/78	7/18/78	8/03/78	8/29/78	9/05/78
Sample Number	0425A	0425B	0425C	0425D	0425G	0425H
Sample Code	A	A	A	A	A	A
Rank-Abundance:						
Audouinella	3-C	--	--	--	--	5-C
Bacillariophyceae	2-VC	2-VA	2-VA	1-VA	2-VA	2-VA
Chara	--	--	--	--	--	--
Cladophora	1-VA	1-VA	1-VA	2-A	1-VA	1-VA
Closterium	--	4-R	--	--	--	--
Oedogonium	--	5-R	--	--	--	--
Oscillatoria	4-R	--	--	--	--	--
Pediastrum	--	--	--	--	--	--
Phormidium	--	6-R	--	3-C	3-A	4-VC
Spirogyra	--	--	--	--	--	--
Stigeoclonium	--	3-VC	--	--	4-C	3-A
Total Diatom Taxa	44	32	34	44	38	39
Total Taxa Counted	42	29	27	33	31	30
Frustules Counted	320	330	342	372	338	314
Diversity	4.252	3.813	3.283	3.736	3.848	3.100
Equitability	0.67	0.69	0.52	0.58	0.68	0.40
PRA Achnanthes sp.	3.5	3.0	5.8	4.8	3.3	3.8
PRA Nitzschia sp.	21.0	14.2	6.5	20.9	13.0	14.3
PRA Major Species:						
Achnanthes minutissima	--	--	--	--	--	--
Cymbella affinis	--	10.0	--	11.6	24.3	44.6
Diatoma vulgare	--	--	14.0	--	13.6	14.3
Fragilaria crotonensis	--	--	--	--	--	--
Gomphonema olivaceum	17.5	23.6	--	--	--	--
Gomphonema tenellum	--	--	12.3	--	--	--
Navicula cryotocephala	--	18.8	27.2	11.0	--	--
Navicula radiosa	--	--	20.2	25.0	--	--
Navicula tripunctata	--	--	--	--	11.8	--
Navicula viridula	21.9	--	--	--	--	--
Nitzschia dissipata	--	--	--	15.1	--	--

Table I138. Continued (the second page of three pages).

	Upper Rosebud Creek					
Collection Date	10/08/78	11/05/78	4/01/79	5/20/79	7/27/79	8/08/79
Sample Number	0425I	0425J	0425L	0425M	0425N	0425Ø
Sample Code	A	A	B	A	C	D
Rank-Abundance:						#
Audouinella	--	--	--	4-C	--	--
Bacillariophyceae	1-VA	1-VA	1-C	1-VA	2-A	--
Chara	--	--	--	--	--	--
Cladophora	--	--	--	2-A	1-VA	--
Closterium	--	--	--	--	--	--
Oedogonium	--	--	--	--	--	--
Oscillatoria	--	--	--	5-R	--	--
Pediastrum	--	--	--	--	--	--
Phormidium	--	--	--	--	--	--
Spirogyra	--	--	--	--	--	--
Stigeoclonium	--	--	--	3-C	--	--
Total Diatom Taxa	45	43	--	37	--	49
Total Taxa Counted	36	36	--	30	--	49*
Frustules Counted	328	332	--	352	--	1524*
Diversity	3.931	3.599	--	2.609	--	3.397
Equitability	0.61	0.49	--	0.28	--	0.31
PRA Achnanthes sp.	4.0	0.3	--	1.5	--	2.2
PRA Nitzschia sp.	15.2	9.0	--	9.1	--	18.0
PRA Major Species:						
Achnanthes minutissima	--	--	--	--	--	--
Cymbella affinis	--	--	--	--	--	44.3
Diatoma vulgare	16.2	11.1	--	--	--	--
Fragilaria crotonensis	--	--	--	--	--	--
Gomphonema olivaceum	--	20.2	--	48.0	--	--
Gomphonema tenellum	--	--	--	--	--	--
Navicula cryptocephala	--	--	--	--	--	12.8
Navicula radiosa	--	--	--	--	--	--
Navicula tripunctata	--	--	--	--	--	--
Navicula viridula	24.1	25.6	--	26.7	--	--
Nitzschia dissipata	--	--	--	--	--	--

*For the "semi-detailed" analysis, 93 diatom taxa and 16,764 frustules were counted.

#This collection was not examined for the non-diatom algae.

Table I138. Continued (the third page of three pages)

	Upper Rosebud Creek				Pond
Collection Date	8/17/79	9/05/79	9/15/79	10/18/79	8/08/79
Sample Number	0425P	0425Q	0425R	0425S	0659A
Sample Code	C	C	C	C	A
Rank-Abundance:					
Audouinella	--	--	--	--	--
Bacillariophyceae	2-A	1-VA	2-VA	2-VA	1-A
Chara	--	--	--	--	2-VC
Cladophora	1-VA	2-VA	3-A	1-VA	--
Closterium	--	--	--	--	4-R
Oedogonium	--	--	--	--	--
Oscillatoria	--	--	--	--	--
Pediastrum	--	--	--	--	5-R
Phormidium	--	--	--	--	3-C
Spirogyra	--	3-VC	1-VA	--	--
Stigeoclonium	3-C	--	--	--	--
Total Diatom Taxa	--	--	--	--	50
Total Taxa Coated	--	--	--	--	43
Frustules Counted	--	--	--	--	388
Diversity	--	--	--	--	3.467
Equitability	--	--	--	--	0.37
PRA Achnanthes sp.	--	--	--	--	32.5
PRA Nitzschia sp.	--	--	--	--	18.6
PRA Major Species:					
Achnanthes minutissima	--	--	--	--	30.7
Cymbella affinis	--	--	--	--	--
Diatoma vulgare	--	--	--	--	--
Fragilaria crotonensis	--	--	--	--	27.6
Gomphonema olivaceum	--	--	--	--	--
Gomphonema tenellum	--	--	--	--	--
Navicula cryptocephala	--	--	--	--	--
Navicula radiosa	--	--	--	--	--
Navicula tripunctata	--	--	--	--	--
Navicula viridula	--	--	--	--	--
Nitzschia dissipata	--	--	--	--	--

Table I139. Periphyton community data and major algal taxa obtained from natural substrates collected from middle Rosebud Creek near Colstrip and from lower Rosebud Creek near Rosebud.

	Middle Rosebud Creek					Lower Rosebud Creek			
Collection Date	7/12/78	8/22/78	8/24/78	7/03/79	8/24/79	8/23/78a	8/23/78b	6/13/79	11/07/79
Sample Number	0526A	0526C	0526B	0526D	0526E	0530A	0529A	0529B	0529C
Sample Code	B	A	B	B	B	B	A	B	B
Rank-Abundance:									
Audouinella	--	--	--	--	3-C	--	--	3-R	--
Bacillariophyceae	1-C	2-C	2-C	1-C	2-C	1-C	2-C	1-VC	1-A
Cladophora	--	1-VA	1-VC	--	1-VC	--	1-VC	2-C	2-C
Total Diatom Taxa	--	41	--	--	--	--	22	--	--
Total Taxa Counted	--	30	--	--	--	--	22	--	--
Frustules Counted	--	358	--	--	--	--	185	--	--
Diversity	--	2.915	--	--	--	--	4.758	--	--
Equitability	--	0.37	--	--	--	--	1.82	--	--
PRA Achnanthes sp.	--	trace	--	--	--	--	0.0	--	--
PRA Nitzschia sp.	--	50.9	--	--	--	--	30.8	--	--
PRA Major Species:									
Cocconeis pediculus	--	27.4	--	--	--	--	--	--	--
Navicula cincta	--	--	--	--	--	--	11.4	--	--
Navicula symmetrica	--	--	--	--	--	--	10.8	--	--
Nitzschia frustulum	--	38.9	--	--	--	--	--	--	--
Stephanodiscus subtilis	--	--	--	--	--	--	14.6	--	--

a--Collected at T05N,R42E,08D (upstream sampling site).
b--Collected at T06N,R42E,16D (sampling site near mouth).

Table I140. Periphyton community data and major algal taxa obtained from natural substrates collected from Indian Creek near Kirby.

Collection Date	7/25/78	8/24/78	8/29/78	11/05/78	6/26/79	7/17/79	8/08/79	9/28/79	11/06/79
Sample Number	0528A	0528B	0528C	0528D	0528E	0528F	0528G	0528H	0528I
Sample Code	B	B	B	B	B	B	D	B	C
Rank-Abundance:									
Ankistrodesmus	--	--	--	--	--	--	7-C	--	--
Audouinella	4-VC	--	4-C	4-C	--	--	5-VC	--	--
Bacillariophyceae	3-A	2-VA	2-A	1-VA	1-VA	2-A	1-VA	2-VA	2-VA
Ceratium	--	--	--	--	--	--	10-C	--	--
Chara	--	--	--	--	--	--	4-VC	--	--
Cladophora	1-VA	1-VA	1-VA	3-VC	3-VC	4-C	2-A	1-VA	1-VA
Closterium	--	--	5-R	--	4-C	--	--	--	--
Coelastrum	--	--	--	--	--	--	8-C	--	--
Dinobryon	--	--	--	--	--	--	12-R	--	--
Oedogonium	--	--	--	--	--	--	--	4-C	--
Oscillatoria	--	--	3-C	--	--	3-C	6-VC	5-C	--
Phormidium	5-VC	3-C	--	--	2-A	1-VA	3-A	--	--
Spirogyra	--	--	--	--	--	--	9-C	3-VC	4-VC
Trachelomonas	--	--	--	--	--	--	11-R	--	--
Vaucheria	2-A	--	--	2-A	--	--	--	--	3-A
Total Diatom Taxa	--	--	--	--	--	--	59	--	--
Total Taxa Counted	--	--	--	--	--	--	59*	--	--
Frustules Counted	--	--	--	--	--	--	3100*	--	--
Diversity	--	--	--	--	--	--	3.268	--	--
Equitability	--	--	--	--	--	--	0.24	--	--
PRA Achnanthes sp.	--	--	--	--	--	--	11.3	--	--
PRA Nitzschia sp.	--	--	--	--	--	--	14.1	--	--
PRA Major Species:									
Achnanthes minutissima	--	--	--	--	--	--	10.8	--	--
Cymbella affinis	--	--	--	--	--	--	43.7	--	--

*For the "semi-detailed" analysis, 106 diatom taxa and 27,900 frustules were counted.

Table I141. Periphyton community data and major algal taxa obtained from natural substrates collected from Davis Creek near Busby and from Muddy Creek near Busby-Lame Deer.

	Davis Creek				Muddy Creek					
Collection Date	6/26/78	7/25/78	9/08/78	8/24/79	6/26/78	7/25/78	9/08/78	5/20/79	8/24/79	11/02/79
Sample Number	0427A	0427B	0427C	0427D	0428A	0428B	0428C	0428D	0428E	0428F
Sample Code	A	B	B	B	A	B	B	B	B	B
Rank-Abundance:										
Audouinella	3-C	--	--	--	--	--	--	--	--	4-C
Bacillariophyceae	2-A	2-A	1-A	1-VC	2-VC	3-A	1-VA	1-VA	2-VA	1-VA
Cladophora	--	--	--	--	1-A	1-VA	4-VC	2-A	1-VA	--
Closterium	--	--	--	--	--	--	--	--	3-C	--
Mougeotia	--	--	--	--	--	--	8-R	--	--	--
Oedogonium	--	--	--	--	--	4-VC	7-C	--	--	6-R
Oscillatoria	--	--	--	--	--	--	--	5-R	--	5-C
Phormidium	--	3-R	--	--	--	--	--	--	--	--
Rhizoclonium	1-VA	--	--	--	--	--	3-A	--	--	--
Stigeoclonium	--	--	--	--	--	--	2-VA	4-C	--	3-VC
Tribonema	--	--	--	--	--	--	6-C	--	--	--
Vaucheria	--	1-A	2-VC	--	--	2-A	5-VC	3-VC	--	2-A
Total Diatom Taxa	43	--	--	--	40	--	--	--	--	--
Total Taxa Counted	32	--	--	--	37	--	--	--	--	--
Frustules Counted	338	--	--	--	365	--	--	--	--	--
Diversity	1.811	--	--	--	3.956	--	--	--	--	--
Equitability	0.14	--	--	--	0.62	--	--	--	--	--
PRA Achnanthes sp.	0.9	--	--	--	8.0	--	--	--	--	--
PRA Nitzschia sp.	5.7	--	--	--	28.5	--	--	--	--	--
PRA Major Species:										
Cocconeis placentula	76.3	--	--	--	19.5	--	--	--	--	--
Nitzschia frustulum	--	--	--	--	22.5	--	--	--	--	--

Table I142. Periphyton community data and major algal taxa obtained from natural substrates collected from Lame Deer Creek near Lame Deer and from Cow Creek near Colstrip.

	Lame Deer Creek					Cow Creek
Collection Date	7/12/78	8/16/78	8/27/78	11/05/78	11/06/79	5/20/79
Sample Number	0524A	0524B	0524C	0524D	0524E	623A
Sample Code	B	A	B	B	B	A
Rank-Abundance:						
Audouinella	--	--	2-VC	2-C	--	--
Aulosira	--	--	--	--	--	3-VC
Bacillariophyceae	3-A	2-A	1-A	1-A	1-VA	1-VA
Cladophora	1-VA	--	--	--	--	--
Euglena	--	--	3-R	--	--	--
Hormidium	--	--	--	--	--	4-C
Oedogonium	4-R	--	--	4-R	--	--
Oscillatoria	--	--	--	--	--	2-VC
Phormidium	--	--	--	3-C	--	--
Spirogyra	--	--	--	--	3-R	--
Tribonema	--	--	--	--	2-C	--
Vaucheria	2-VA	1-A	--	--	--	--
Total Diatom Taxa	--	51	--	--	--	55
Total Taxa Counted	--	37	--	--	--	36
Frustules Counted	--	324	--	--	--	349
Diversity	--	3.718	--	--	--	3.703
Equitability	--	0.51	--	--	--	0.53
PRA Achnanthes sp.	--	12.0	--	--	--	0.3
PRA Nitzschia sp.	--	7.9	--	--	--	22.9
PRA Major Species:						
Cocconeis placentula	--	24.4	--	--	--	--
Entomoneis paludosa	--	--	--	--	--	10.3
Navicula cincta	--	--	--	--	--	12.3
Navicula viridula	--	25.0	--	--	--	--
Synedra famelica	--	--	--	--	--	30.9

Table I143. Periphyton community data and major algal taxa obtained from natural substrates collected from the Tongue River and the Interstate Ditch near Sheridan-Decker.

	Tongue River				Interstate Ditch
Collection Date	7/07/78	8/26/78	6/26/79	7/26/79	10/18/79
Sample Number	0362B	0362C	0362D	0362E	0696A
Sample Code	B	A	B	B	A
Rank-Abundance:					
Bacillariophyceae	1-VC	2-VC	1-A	1-A	1-VA
Calothrix	--	--	--	4-C	--
Cladophora	2-C	1-A	3-VC	2-VC	--
Closterium	--	--	4-R	--	3-R
Oedogonium	--	--	--	6-R	--
Phormidium	4-R	--	--	3-VC	2-VC
Stigeoclonium	3-R	3-VC	2-VC	7-R	--
Tolypothrix	--	--	--	5-R	--
Total Diatom Taxa	--	44	--	--	80
Total Taxa Counted	--	34	--	--	59
Frustules Counted	--	354	--	--	421
Diversity	--	4.128	--	--	4.968
Equitability	--	0.76	--	--	0.80
PRA Achnanthes sp.	--	9.7	--	--	2.8
PRA Nitzschia sp.	--	23.7	--	--	36.3
PRA Major Species:					
Cocconeis placentula	--	15.5	--	--	--
Navicula cryptocephala	--	--	--	--	11.9
Nitzschia frustulum	--	15.2	--	--	--
Rhoicosphenia curvata	--	11.3	--	--	--

Table I144. Periphyton community data and major algal taxa obtained from natural substrates collected from Ash and Youngs Creeks near Sheridan-Decker.

	Ash Creek				Youngs Creek			
Collection Date	6/10/78	7/26/79	8/30/79	10/18/79	8/26/78	7/13/79	7/26/79	10/18/79
Sample Number	0417A	0658A	0658B	0658C	0417B	0417C	0417D	0417E
Sample Code	A	B	A	B	A	B	B	B
Rank-Abundance:								
Audouinella	--	--	--	--	--	3-VC	3-C	3-VC
Bacillariophyceae	1-VA	1-VA	2-VA	3-A	2-A	1-VA	1-VA	2-A
Cladophora	2-VC	2-VC	--	5-VC	1-A	2-A	2-VC	1-VA
Euglena	--	--	--	--	--	--	4-R	--
Mougeotia	--	--	--	4-VC	--	--	--	--
Oedogonium	--	--	--	6-C	--	--	--	5-C
Oscillatoria	--	--	4-VC	--	--	--	--	--
Phormidium	--	--	--	--	--	--	--	4-VC
Spirogyra	--	--	1-VA	1-A	--	--	--	--
Tribonema	--	--	--	7-R	--	--	--	--
Vaucheria	--	--	3-A	2-A	--	--	--	--
Total Diatom Taxa	26	--	70	--	52	--	--	--
Total Taxa Counted	17	--	56	--	34	--	--	--
Frustules Counted	337	--	401	--	348	--	--	--
Diversity	2.362	--	4.487	--	3.001	--	--	--
Equitability	0.41	--	0.59	--	0.32	--	--	--
PRA Achnanthes sp.	trace	--	21.6	--	5.2	--	--	--
PRA Nitzschia sp.	14.5	--	14.2	--	56.7	--	--	--
PRA Major Species:								
Achnanthes minutissima	--	--	20.9	--	--	--	--	--
Navicula cryptocephala	--	--	16.7	--	--	--	--	--
Navicula viridula	49.2	--	--	--	12.1	--	--	--
Nitzschia frustulum	--	--	--	--	51.4	--	--	--
Surirella ovata	18.7	--	11.7	--	--	--	--	--
Synedra ulna	13.4	--	--	--	--	--	--	--

Table I145. Periphyton community data and major algal taxa obtained from natural substrates collected from the Tongue River near Pyramid Butte-Birney (the first page of three pages).

Collection Date	6/28/78	7/19/78	8/03/78	8/24/78	9/05/78
Sample Number	0364B	0364C	0364D	0364E	0364G
Sample Code	A	A	A	A	A
Rank-Abundance:					
Agmenellum	--	--	--	--	--
Anabaena	--	--	--	--	--
Audouinella	--	--	--	3-R	--
Bacillariophyceae	1-A	2-VA	2-VA	2-A	2-A
Cladophora	2-R	1-VA	1-VA	1-VA	1-VA
Closterium	4-R	3-R	--	--	--
Cosmarium	--	4-R	--	--	4-R
Mougeotia	--	--	3-R	--	--
Oedogonium	3-R	--	--	--	--
Oscillatoria	--	--	--	--	--
Phormidium	--	--	--	--	--
Scenedesmus	--	--	--	--	--
Spirogyra	--	--	--	--	3-VC
Tribonema	--	--	--	--	--
Total Diatom Taxa	43	36	38	32	26
Total Taxa Counted	41	31	32	27	23
Frustules Counted	327	350	396	357	355
Diversity	4.521	3.190	3.983	3.327	3.063
Equitability	0.83	0.42	0.72	0.52	0.52
PRA Achnanthes sp.	2.1	1.7	6.1	33.6	38.0
PTA Nitzschia sp.	17.3	11.2	14.9	2.8	2.8
PRA Major Species:					
Achnanthes minutissima	--	--	--	33.6	38.0
Cocconeis pediculus	--	--	--	12.9	12.1
Cyclotella glomerata	--	--	--	--	--
Cymbella affinis	10.7	--	--	--	--
Diatoma vulgare	--	35.4	21.0	--	--
Fragilaria capucina	12.5	--	--	--	--
Fragilaria vaucheriae	--	--	--	--	--
Gomphonema olivaceum	--	--	--	--	--
Gomphonema tenellum	--	--	--	12.6	10.1
Melosira varians	--	14.9	--	--	--
Navicula cincta	--	--	--	--	--
Nitzschia dissipata	--	--	13.6	--	--
Rhoicosphenia curvata	--	--	--	11.2	14.4
Synedra ulna	--	--	--	--	--

Table I145. Continued (the second page of three pages).

Collection Date	10/08/78	11/04/78	3/31/79	5/19/79	6/21/79
Sample Number	0364I	0364J	0364L	0364M	0364N
Sample Code	A	A	A	A	A
Rank-Abundance:					
Agmenellum	--	--	--	--	--
Anabaena	--	--	--	--	--
Audouinella	--	--	--	--	--
Bacillariophyceae	1-VA	1-VA	2-VA	1-VA	2-A
Cladophora	--	--	1-VA	2-VA	3-VC
Closterium	4-R	--	--	--	--
Cosmarium	--	--	--	--	--
Mougeotia	--	2-A	--	--	--
Oedogonium	--	--	--	--	--
Oscillatoria	--	--	--	--	--
Phormidium	2-VC	3-VC	--	--	--
Scenedesmus	3-R	4-R	--	--	--
Spirogyra	--	--	--	3-A	1-VA
Tribonema	--	--	--	--	--
Total Diatom Taxa	55	51	26	37	59
Total Taxa Counted	48	44	20	29	54
Frustules Counted	376	366	336	337	372
Diversity	4.450	4.884	2.848	3.632	4.819
Equitability	0.67	1.00	0.50	0.62	0.78
PRA Achnanthes sp.	17.1	12.8	1.8	4.7	14.3
PRA Nitzschia sp.	20.1	35.0	0.3	7.1	14.2
PRA Major Species:					
Achnanthes minutissima	16.8	12.0	--	--	14.0
Cocconeis pediculus	--	--	--	--	--
Cyclotella glomerata	--	--	--	18.1	--
Cymbella affinis	--	--	--	--	--
Diatoma vulgare	--	--	17.9	--	--
Fragilaria capucina	--	--	--	--	--
Fragilaria vaucheria	--	--	36.6	18.7	--
Gomphonema olivaceum	--	--	13.7	19.6	--
Gomphonema tenellum	--	--	--	--	--
Melosira varians	--	--	--	--	--
Navicula cincta	--	--	--	--	--
Nitzschia dissipata	11.4	13.7	--	--	--
Rhoicosphenia curvata	--	--	--	--	--
Synedra ulna	--	--	11.9	--	--

Table I145. Continued (the third page of three pages).

Collection Date	8/01/79	8/08/79	8/18/79	11/02/79	11/05/79
Sample Number	0364Ø	0364P	0364Q	0364R	0364S
Sample Code	A	D	C	C	C
Rank-Abundance:		#			
Agmenellum	--	--	--	5-R	--
Anabaena	--	--	7-C	--	--
Audouinella	--	--	--	--	--
Bacillariophyceae	2-VC	--	3-A	2-VA	2-A
Cladophora	1-VA	--	1-VA	--	--
Closterium	--	--	--	--	--
Cosmarium	--	--	--	--	--
Mougeotia	--	--	4-A	3-A	3-VC
Oedogonium	--	--	5-VC	--	--
Oscillatoria	--	--	6-C	4-VC	4-C
Phormidium	3-C	--	--	--	--
Scenedesmus	--	--	9-R	--	--
Spirogyra	--	--	2-A	1-VA	1-VA
Tribonema	--	--	8-C	--	--
Total Diatom Taxa	45	57	--	--	--
Total Taxa Counted	38	57*	--	--	--
Frustules Counted	354	251*	--	--	--
Diversity	3.976	4.838	--	--	--
Equitability	0.61	0.75	--	--	--
PRA Achnanthes sp.	16.7	7.3	--	--	--
PRA Nitzschia sp.	3.7	14.4	--	--	--
PRA Major Species:					
Achnanthes minutissima	15.5	--	--	--	--
Cocconeis pediculus	12.1	--	--	--	--
Cyclotella glomerata	--	--	--	--	--
Cymbella affinis	--	--	--	--	--
Diatoma vulgare	--	--	--	--	--
Fragilaria capucina	--	--	--	--	--
Fragilaria vaucheriae	--	--	--	--	--
Gomphonema olivaceum	--	--	--	--	--
Gomphonema tenellum	--	--	--	--	--
Melosira varians	--	--	--	--	--
Navicula cincta	--	15.8	--	--	--
Nitzschia dissipata	--	--	--	--	--
Rhoicosphenia curvata	11.0	--	--	--	--
Synedra ulna	--	--	--	--	--

*For the "semi-detailed" reading, 152 diatom taxa and 9,538 frustules were counted.

#This collection was not examined for the non-diatom algae.

Table I146. Periphyton community data and major algal taxa obtained from natural substrates collected from Squirrel Creek near Decker (the first page of two pages).

Collection Date	6/10/78	8/26/78	11/04/78	4/01/79	5/20/79	6/21/79
Sample Number	0418A	0418B	0418C	0418D	0418E	0418F
Sample Code	A	A	A	A	A	A
Rank-Abundance:						
Anabaena	3-R	--	--	--	--	--
Audouinella	--	--	--	2-C	--	--
Bacillariophyceae	2-A	1-VA	1-A	1-A	2-VC	2-VC
Cladophora	1-VA	2-VC	--	3-R	1-A	--
Closterium	--	--	--	--	--	--
Oscillatoria	--	--	--	--	--	--
Phormidium	--	--	--	--	--	--
Spirogyra	--	--	--	--	--	--
Spirulina	--	--	--	--	--	--
Stigeoclonium	--	--	--	--	--	--
Vaucheria	--	--	--	--	--	1-VA
Total Diatom Taxa	38	46	43	23	31	37
Total Taxa Counted	33	39	31	17	30	31
Frustules Counted	344	394	359	327	359	346
Diversity	3.797	3.790	3.557	2.414	3.526	4.129
Equitability	0.61	0.51	0.55	0.41	0.57	0.84
PRA Achnanthes sp.	0.3	4.4	5.6	5.8	0.6	0.3
PRA Nitzschia sp.	32.7	27.0	26.3	47.1	25.8	32.4
PRA Major Species:						
Navicula cryptocephala	11.1	31.0	--	--	--	17.0
Navicula gregaria	--	--	--	--	12.8	--
Navicula viridula	28.8	--	27.6	29.1	32.3	--
Nitzschia dissipata	--	--	15.0	--	--	--
Nitzschia frustulum	--	16.2	--	43.1	--	13.3
Nitzschia longissima	--	--	--	--	--	--
Rhoicosphenia curvata	--	--	--	--	--	--
Surirella ovata	--	--	15.6	--	--	11.8

Table 1146. Continued (the second page of two pages).

Collection Date	7/26/79	8/08/79	8/17/79	9/28/79	10/18/79	11/06/79
Sample Number	0418G	0418H	0418J	0418N	0418Ø	0418R
Sample Code	A	D	C-A@	C	A	A
Rank-Abundance:						
Anabaena	--	--	--	--	--	--
Audouinella	2-VC	3-VC	--	--	4-C	--
Bacillariophyceae	1-VA	1-VA	2-VA	2-A	2-A	2-VA
Cladophora	--	2-A	1-VA	1-VA	--	--
Closterium	--	5-R	--	--	--	--
Oscillatoria	--	--	3-VC	3-C	3-C	--
Phormidium	3-C	--	--	--	--	--
Spirogyra	--	4-VC	--	--	--	3-VC
Spirulina	--	--	4-C	--	--	--
Stigeoclonium	4-R	--	--	--	--	--
Vaucheria	--	--	--	--	1-VA	1-VA
Total Diatom Taxa	38	52	53	--	48	46
Total Taxa Counted	31	52*	41	--	35	40
Frustules Counted	365	502*	326	--	325	356
Diversity	3.391	4.487	4.054	--	4.124	4.558
Equitability	0.48	0.63	0.59	--	0.74	0.88
PRA Achnanthes sp.	0.3	1.0	0.3	--	2.1	1.7
PRA Nitzschia sp.	41.2	38.0	43.8	--	39.0	22.3
PRA Major Species:						
Navicula cryptocephala	39.1	21.2	--	--	10.7	--
Navicula gregaria	--	--	--	--	--	--
Navicula viridula	--	--	--	--	18.8	29.8
Nitzschia dissipata	--	--	--	--	10.5	--
Nitzschia frustulum	20.5	17.4	--	--	13.8	--
Nitzschia longissima	--	--	27.3	--	--	--
Rhoicosphenia curvata	--	--	13.2	--	--	--
Surirella ovata	--	--	--	--	--	--

*For the "semi-detailed" analysis, 104 diatom taxa and 11,044 frustules were counted.

@This sample was initially intended for a non-diatom assessment, but the diatomaceous component of the tychoplankton that was collected was also analyzed along with the benthic macroalgae.

Table I147. Periphyton community data and major algal taxa obtained from natural substrates collected from Deer Creek near Decker and from Canyon Creek near Decker-Birney.

	Deer Creek				Canyon Creek			
Collection Date	6/10/78	8/15/78	8/26/78	10/18/79	11/04/78	6/26/79	7/27/79	11/02/79
Sample Number	0168B	0168C	0168D	0168E	0585A	0585B	0585C	0585D
Sample Code	A	B	A	B	B	B	A	B
Rank-Abundance:								
Agmenellum	--	--	--	--	5-R	--	5-C	--
Anabaena	--	6-R	--	--	--	--	--	--
Ankistrodesmus	4-R	--	--	--	--	--	8-R	--
Bacillariophyceae	1-VC	2-A	1-VC	1-VC	1-VA	1-A	2-A	2-A
Chara	--	3-VC	2-VC	--	--	--	1-A	3-VC
Chroococcus	--	--	--	--	--	--	7-R	--
Closterium	--	--	--	--	4-R	--	6-C	4-C
Hormidium	--	7-R	--	--	--	--	--	--
Lyngbya	3-R	--	--	--	--	--	--	--
Oedogonium	--	--	5-C	--	2-A	--	--	1-VA
Oscillatoria	--	5-R	4-C	3-R	--	--	--	--
Pediastrum	--	--	--	--	3-R	--	4-VC	--
Phormdium	--	--	3-VC	2-C	--	2-C	3-VC	--
Rhizoclonium	--	1-VA	--	--	--	--	--	--
Scenedesmus	--	--	--	--	--	3-R	--	--
Stigioclonium	2-R	4-C	--	--	--	--	--	--
Total Diatom Taxa	43	--	39	--	--	--	57	--
Total Taxa Counted	36	--	35	--	--	--	34	--
Frustules Counted	215	--	148	--	--	--	364	--
Diversity	3.928	--	4.139	--	--	--	2.703	--
Equitability	0.61	--	0.74	--	--	--	0.26	--
PRA Achnanthes sp.	3.8	--	4.7	--	--	--	35.7	--
PRA Nitzschia sp.	33.9	--	31.1	--	--	--	4.3	--
PRA Major Species:								
Achnanthes minutissima	--	--	--	--	--	--	35.7	--
Cymbella affinis	--	--	--	--	--	--	13.5	--
Cymbella microcephala	--	--	--	--	--	--	16.5	--
Navicula cincta	26.3	--	24.3	--	--	--	--	--
Nitzschia frustulum	16.2	--	20.2	--	--	--	--	--

Table I148. Periphyton community data and major algal taxa obtained from natural substrates collected from Prairie Dog and Bull Creeks near Pyramid Butte-Birney.

	Prairie Dog Creek			Bull Creek	
Collection Date	7/12/79	8/18/79	11/02/79	7/12/79	8/30/79
Sample Number	0653A	0653B	0653C	0655A	0655B
Sample Code	B	A-C@	B	B	A
Rank-Abundance:					
Agmenellum	--	6-C	5-C	--	--
Anabaena	--	8-R	--	--	--
Bacillariophyceae	1-A	2-VA	1-VA	1-VC	1-A
Calothrix	2-VC	--	--	--	--
Chara	--	--	--	2-C	--
Cladophora	--	--	--	--	3-VC
Euglena	--	9-R	--	--	--
Mougeotia	--	3-A	3-VC	--	4-C
Phormidium	3-R	--	--	--	--
Rhizoclonium	--	4-A	--	--	--
Scenedesmus	--	7-R	--	--	--
Spirogyra	--	1-VA	2-A	--	2-A
Zygnema	--	5-VC	4-C	--	--
Total Diatom Taxa	--	72	--	--	51
Total Taxa Counted	--	45	--	--	40
Frustules Counted	--	364	--	--	370
Diversity	--	4.012	--	--	3.711
Equitability	--	0.53	--	--	0.48
PRA Achnanthes sp.	--	23.3	--	--	30.8
PRA Nitzschia sp.	--	41.8	--	--	17.9
PRA Major Species:					
Achnanthes minutissima	--	22.8	--	--	30.3
Cymbella microcephala	--	--	--	--	17.3
Diatoma tenue	--	--	--	--	10.3
Navicula cincta	--	12.1	--	--	--
Nitzschia sp.	--	16.5	--	--	--

@Macroalgae specimens were also collected from a large ponded segment of the stream.

Table I149. Periphyton community data and major algal taxa obtained from natural substrates collected from Crazy Head Springs (pond) near Ashland-Lame Deer and from Cook Creek near Birney-Birney Village.

	Crazy Head Springs	Cook Creek			
Collection Date	8/09/79	6/11/78	8/24/78	9/08/78	9/05/79
Sample Number	0660A	0420A	0420B	0420C	0420D
Sample Code	A	A	A	B	B
Rank-Abundance:					
Bacillariophyceae	1-VA	1-C	2-A	2-VC	2-VA
Calothrix	8-R	--	--	--	--
Chaetophora	3-VC	--	--	--	--
Cladophora	9-R	--	--	4-C	--
Closterium	7-C	--	--	--	--
Euglena	11-R	--	--	--	--
Lyngbya	--	--	--	--	3-A
Mougeotia	2-A	--	--	--	5-VC
Nostoc	12-R	--	--	--	--
Oedogonium	6-C	--	--	6-R	6-C
Pleurotaenium	10-R	--	--	--	--
Rhizocloneium	13-R	--	--	5-C	--
Rivularia	4-VC	--	--	--	--
Spirogyra	5-C	--	--	3-VC	1-VA
Tribonema	--	--	--	7-R	4-A
Vaucheria	--	--	1-A	1-VA	7-C
Total Diatom Taxa	38	35	76	--	--
Total Taxa Counted	30	33	51	--	--
Frustules Counted	333	120	348	--	--
Diversity	3.756	4.215	4.191	--	--
Equitability	0.50	0.82	0.53	--	--
PRA Achnanthes sp.	18.9	5.0	23.6	--	--
PRA Nitzschia sp.	21.3	44.1	15.4	--	--
PRA Major Species:					
Achnanthes lanceolata	--	--	20.7	--	--
Achnanthes minutissima	18.9	--	--	--	--
Cocconeis pediculus	22.5	--	--	--	--
Cyclotella meneghiniana	--	19.2	--	--	--
Cymbella microcephala	13.5	--	--	--	--
Navicula gregaria	--	--	19.5	--	--
Nitzschia frustulum	16.8	13.4	--	--	--
Nitzschia kutzingiana	--	10.0	--	--	--
Nitzschia palea	--	10.0	--	--	--

Table I150. Periphyton community data and major algal taxa obtained from natural substrates collected from Logging Creek near Ashland.

Collection Date	6/27/78	8/16/78	9/08/78	7/28/79	9/06/79
Sample Number	0429A	0429B	0429C	0429D	0429E
Sample Code	B	B	B	A	B
Rank-Abundance:					
Anabaena	--	--	--	3-R	--
Audouinella	--	--	2-VC	--	4-C
Bacillariophyceae	3-VC	1-A	1-A	1-VC	1-A
Cladophora	--	2-A	--	--	--
Phormidium	--	--	3-C	2-VC	3-VC
Spirogyra	2-VC	--	--	--	--
Vaucheria	1-A	--	--	--	2-A
Total Diatom Taxa	--	--	--	52	--
Total Taxa Counted	--	--	--	40	--
Frustules Counted	--	--	--	145	--
Diversity	--	--	--	4.509	--
Equitability	--	--	--	0.85	--
PRA Achnanthes sp.	--	--	--	11.0	--
PRA Nitzschia sp.	--	--	--	39.4	--
PRA Major Species:					
Achnanthes minutissima	--	--	--	10.3	--
Navicula cincta	--	--	--	13.8	--
Nitzschia frustulum	--	--	--	15.2	--

Table I151. Periphyton community data and major algal taxa obtained from natural substrates collected from Beaver Creek near Brandenberg.

Collection Date	7/13/78	9/03/78	10/09/78	11/05/78	7/12/79	7/18/79	8/24/79
Sample Number	0525A	0525B	0525C	0525D	0525E	0525F	0525G
Sample Code	B	B	B	B	B	B	A
Rank-Abundance:							
Bacillariophyceae	2-A	1-A	1-A	1-C	3-VC	3-A	1-VA
Calothrix	--	--	--	--	--	8-C	--
Chaetophora	--	--	--	--	5-C	2-VA	--
Chara	1-A	--	--	--	--	--	--
Cladophora	3-VC	--	2-VC	--	1-A	5-VC	--
Closterium	--	--	--	--	--	--	5-C
Euglena	--	--	--	2-R	--	--	--
Lyngbya	--	--	--	--	--	6-C	3-VC
Oedogonium	4-VC	--	--	--	--	4-VC	--
Oscillatoria	--	--	--	--	--	7-C	4-VC
Phormidium	--	3-VC	3-C	--	6-R	--	--
Spirogyra	--	2-VC	--	--	4-VC	1-VA	2-A
Spirulina	--	--	--	--	--	--	6-R
Stigeoclonium	--	4-C	--	--	2-A	--	--
Trichodesmium	--	--	--	--	--	9-R	--
Total Diatom Taxa	--	--	--	--	--	--	49
Total Taxa Counted	--	--	--	--	--	--	43
Frustules Counted	--	--	--	--	--	--	364
Diversity	--	--	--	--	--	--	4.086
Equitability	--	--	--	--	--	--	0.58
PRA Achnanthes sp.	--	--	--	--	--	--	1.9
PRA Nitzschia sp.	--	--	--	--	--	--	28.0
PRA Major Species:							
Cymbella pusilla	--	--	--	--	--	--	14.0
Navicula cincta	--	--	--	--	--	--	20.8
Nitzschia frustulum	--	--	--	--	--	--	13.4

Table I152. Periphyton community data and major algal taxa obtained from natural substrates collected from upper Hanging Woman Creek near Quietus-Decker (the first page of three pages).

Collection Date	6/16/78	6/28/78	7/18/78	8/15/78	8/28/78
Sample Number	0424A	0424B	0424C	0424D	0424F
Sample Code	A	A	A	A	A
Rank-Abundance:					
Agmenellum	--	--	--	--	--
Ankistrodesmus	--	--	--	--	--
Audouinella	--	--	--	--	4-C
Bacillariophyceae	2-A	2-A	2-A	2-A	1-A
Calothrix	--	--	--	--	--
Cladophora	1-VA	1-VA	1-A	--	3-VC
Hormidium	--	--	--	--	6-R
Mougeotia	--	--	--	--	--
Oedogonium	--	--	--	--	--
Oscillatoria	--	--	--	--	--
Phormidium	--	--	--	--	5-C
Rhizoclonium	--	3-C	--	--	2-VC
Scenedesmus	--	--	--	--	--
Spirogyra	--	--	--	3-VC	--
Stigeoclonium	--	--	--	--	--
Tribonema	--	--	--	1-A	--
Zygnema	--	--	--	--	--
Total Diatom Taxa	46	43	45	43	44
Total Taxa Counted	37	38	39	38	41
Frustules Counted	339	341	332	349	363
Diversity	3.902	4.087	3.992	3.910	4.052
Equitability	0.59	0.66	0.59	0.58	0.58
PRA Achnanthes sp.	5.0	13.8	21.4	15.5	10.5
PRA Nitzschia sp.	20.1	38.2	36.6	47.2	39.7
PRA Major Species:					
Achnanthes minutissima	--	13.8	21.1	15.2	10.2
Cymbella affinis	--	--	--	--	--
Diploneis puella	--	--	--	--	15.2
Gomphonema angustatum	--	--	--	--	--
Navicula cincta	15.3	--	--	11.8	--
Navicula cryptocephala	--	--	--	--	--
Nitzschia frustulum	--	19.1	21.0	36.4	25.7
Nitzschia longissima	--	--	--	--	--
Nitzschia microcephala	--	--	--	--	--
Nitzschia palea	11.8	11.7	--	--	--
Rhoicosphenia curvata	--	--	--	--	--
Synedra famelica	21.2	--	--	--	--
Synedra fasciculata	--	--	10.5	--	--

Table I152. Continued (the second page of three pages).

Collection Date	9/05/78	10/07/78	11/04/78	5/19/79	8/08/79
Sample Number	0424G	0424J	0424K	0424M	0424N
Sample Code	A	A	A	A	D
Rank-Abundance:					#
Agmenellum	--	--	--	--	--
Ankistrodesmus	--	--	3-R	--	--
Audouinella	--	--	--	4-R	--
Bacillariophyceae	2-VC	1-A	1-VA	1-VC	--
Calothrix	--	--	--	--	--
Cladophora	1-A	2-A	2-A	2-VC	--
Hormidium	--	--	--	--	--
Mougeotia	--	--	--	--	--
Oedogonium	--	--	--	5-R	--
Oscillatoria	4-R	--	--	--	--
Phormidium	--	--	--	3-C	--
Rizoclonium	--	--	--	--	--
Scenedesmus	5-R	--	--	--	--
Spirogyra	--	--	--	--	--
Stigeoclonium	3-R	3-C	--	--	--
Tribonema	--	--	--	--	--
Zygnema	--	--	--	--	--
Total Diatom Taxa	52	52	74	42	71
Total Taxa Counted	46	46	56	36	71*
Frustules Counted	365	332	338	376	784*
Diversity	4.350	4.262	4.681	3.510	4.666
Equitability	0.65	0.61	0.68	0.44	0.54
PRA Achnanthes sp.	2.7	5.7	3.3	33.2	1.6
PRA Nitzschia sp.	40.0	41.7	29.1	8.6	58.0
PRA Major Species:					
Achnanthes minutissima	--	--	--	33.2	--
Cymbella affinis	--	--	--	16.8	--
Diploneis puella	16.2	25.6	--	--	--
Gomphonema angustatum	--	--	--	12.2	--
Navicula cincta	29.3	--	--	--	--
Navicula cryptocephala	27.4	--	--	--	--
Nitzschia frustulum	27.7	20.4	--	--	17.0
Nitzschia longissima	--	--	--	--	--
Nitzschia microcephala	--	--	--	--	20.1
Nitzschia palea	--	--	--	--	--
Rhoicosphenia curvata	--	--	10.7	--	--
Synedra famelica	--	--	--	--	--
Synedra fasciculata	--	--	21.6	--	--

*For the "semi-detailed" analysis, 117 diatom taxa and 11,760 frustules were counted.

#This collection was not examined for the non-diatom algae.

Table I152. Continued (the third page of three pages).

Collection Date	9/14/78	9/28/79a	9/28/79b	10/18/79
Sample Number	0424Ø	0693A	0424P	0424Q
Sample Code	A	B	C	C
Rank-Abundance:				
Agmenellum	--	--	--	8-R
Ankistrodesmus	--	--	--	9-R
Audouinella	--	--	--	--
Bacillariophyceae	1-VA	2-VC	3-A	2-A
Calothrix	7-R	--	--	--
Cladophora	3-VC	1-A	2-A	5-C
Hormidium	5-C	--	--	--
Mougeotia	--	--	4-VC	3-VC
Oedogonium	2-VC	--	--	6-C
Oscillatoria	--	3-C	--	7-C
Phormidium	--	--	--	--
Rhizoclonium				
Scenedesmus	--	--	--	--
Spirogyra	4-VC	--	1-VA	1-VA
Stigeoclonium	6-R	--	--	--
Tribonema	--	--	--	--
Zygnema	--	--	--	4-C
Total Diatom Taxa	61	--	--	--
Total Taxa Counted	48	--	--	--
Frustules Counted	352	--	--	--
Diversity	4.482	--	--	--
Equitability	0.69	--	--	--
PRA Achnanthes sp.	7.1	--	--	--
PRA Nitzschia sp.	53.2	--	--	--
PRA Major Species:				
Achnanthes minutissima	--	--	--	--
Cymbella affinis	--	--	--	--
Diploneis puella	--	--	--	--
Gomphonema angustatum	--	--	--	--
Navicula cincta	--	--	--	--
Navicula cryptocephala	--	--	--	--
Nitzschia frustulum	12.5	--	--	--
Nitzschia longissima	14.2	--	--	--
Nitzschia microcephala	15.6	--	--	--
Nitzschia palea	--	--	--	--
Rhoicosphenia curvata	--	--	--	--
Synedra famelica	--	--	--	--
Synedra fasciculata	--	--	--	--

a--Collected at T10S,R43E,02A (near Montana-Wyoming border).
b--Collected at T08S,R43E,17D (major upstream sampling site).

Table I153. Periphyton community data and major algal taxa obtained from natural substrates collected from lower Hanging Woman Creek near Birney (the first page of three pages).

Collection Date	6/16/78	6/29/78	7/19/78	8/15/78	8/28/78	9/05/78	10/07/78
Sample Number	0426A	0426B	0426C	0426D	0426F	0426G	0426J
Sample Code	A	A	A	A	A	A	A
Rank-Abundance:							
Anabaena	--	--	--	--	--	6-R	--
Ankistrodesmus	--	--	--	--	--	--	--
Audouinella	3-C	--	--	--	--	--	4-R
Bacillariophyceae	1-A	2-A	2-A	2-VC	3-VC	1-VC	1-A
Chara	--	--	--	1-VA	4-C	--	--
Cladophora	--	1-VA	--	--	1-VA	--	--
Hormidium	--	--	--	--	--	--	--
Mougeotia	--	--	--	--	--	--	--
Oedogonium	--	--	--	--	--	--	2-C
Oscillatoria	--	--	--	--	--	--	--
Phormidium	4-R	--	--	--	--	2-VC	3-R
Rhizoclonium	2-VC	--	1-A	--	--	--	5-R
Scenedermus	--	--	--	--	--	4-R	--
Spirogyra	--	--	3-C	--	--	--	--
Spirulina	--	--	--	3-R	--	5-R	--
Stigeoclonium	--	--	--	--	--	3-C	--
Tribonema	--	--	--	--	--	--	--
Ulothrix	--	--	--	--	--	--	--
Vaucheria	--	--	--	--	2-A	--	--
Total Diatom Taxa	60	50	45	54	61	70	80
Total Taxa Counted	57	44	36	46	56	57	62
Frustules Counted	346	325	355	346	329	321	330
Diversity	4.970	4.186	2.995	3.772	4.371	4.724	5.016
Equitability	0.82	0.61	0.31	0.43	0.55	0.68	0.78
PRA Achnanthes sp.	4.3	20.3	44.8	35.3	26.7	13.7	7.6
PRA Nitzschia sp.	18.7	9.5	19.7	34.8	21.1	20.5	31.3
PRA Major Species:							
Achnanthes minutissima	--	19.7	44.8	35.3	26.7	13.7	--
Cyclotella meneghiniana	--	--	--	--	--	15.6	13.9
Cymbella affinis	--	18.2	--	--	10.6	--	--
Diatoma tenue	--	--	--	--	--	--	--
Entomoneis paludosa	15.3	--	--	--	--	--	--
Gomphonema olivaceum	--	--	--	--	--	--	--
Navicula cincta	--	11.4	--	--	--	--	--
Nitzschia frustulum	--	--	12.6	17.3	--	--	--
Synedra fasciculata	--	--	18.3	--	--	--	--

Table I153. Continued (the second page of three pages).

Collection Date	11/04/78	2/11/79	3/31/79	5/19/79	8/07/79	9/04/79
Sample Number	0426K	0426M	0426N	0426Ø	0426P	0426Q
Sample Code	A	A	A	A	D #	A
Rank-Abundance:						
Anabaena	3-R	--	--	--	--	--
Ankistrodesmus	5-R	--	--	--	--	--
Audouinella	--	--	--	--	--	--
Bacillariophyceae	1-A	2-A	1-VA	1-A	--	2-A
Chara	--	--	--	--	--	--
Cladophora	--	1-VA	--	--	--	--
Hormidium	--	--	4-R	--	--	--
Mougeotia	7-R	--	--	3-VC	--	3-C
Oedogonium	6-R	--	--	5-C	--	--
Oscillatoria	2-R	--	--	6-R	--	--
Phormidium	4-R	--	--	--	--	--
Rhizoclonium	--	--	--	--	--	--
Scenedesmus	--	--	--	--	--	--
Spirogyra	--	--	3-R	4-C	--	1-VA
Spirulina	--	--	--	--	--	--
Stigeoclonium	--	--	--	--	--	--
Tribonema	--	--	--	7-R	--	--
Ulothrix	--	--	2-C	--	--	--
Vaucheria	--	--	--	2-VC	--	--
Total Diatom Taxa	77	59	49	83	55	62
Total Taxa Counted	54	48	25	77	55	50
Frustules Counted	364	386	354	349	486	321
Diversity	4.746	4.336	2.572	5.372	4.090	4.223
Equitability	0.74	0.62	0.32	0.80	0.45	0.54
PRA Achnanthes sp.	12.6	23.9	13.3	4.1	10.0	13.0
PRA Nitzschia sp.	44.4	15.3	0.9	26.5	33.9	19.3
PRA Major Species:				##		
Achnanthes minutissima	12.1	23.1	13.3	--	--	11.8
Cyclotella meneghiniana	--	--	--	--	--	--
Cymbella affinis	--	13.7	19.8	--	--	24.3
Diatoma tenue	--	--	10.2	--	--	--
Entomoneis paludosa	--	--	--	--	--	--
Gomphonema olivaceum	--	--	44.1	--	--	--
Navicula cincta	--	--	--	--	23.5	10.3
Nitzschia frustulum	15.1	--	--	--	25.3	11.9
Synedra fasciculata	--	--	--	--	--	--

*For the "semi-detailed" analysis, 117 diatom taxa and 21,384 frustules were counted.

#This collection was not examined for the non-datom algae.

##None of the diatom taxa in this sample had PRA values greater than 10%.

Table I153. Continued (the third page of three pages).

Collection Date	9/14/79a	9/14/79b	9/15/79c	9/29/79	10/19/79	11/05/79
Sample Number	0692A	0426R	0118F	0426S	0426T	0426U
Sample Code	B	A	B	C	C	C
Rank-Abundance:						
Anabaena	--	--	--	--	--	--
Ankistrodesmus	--	--	--	--	--	--
Audouinella	--	--	--	--	--	--
Bacillariophyceae	1-VC	1-VA	1-A	3-VC	4-C	4-VC
Chara	--	--	--	--	--	--
Cladophora	--	2-VC	2-VC	1-VA	3-VC	1-VA
Hormidium	--	--	--	--	--	--
Mougeotia	--	--	--	--	--	--
Oedogonium	--	--	4-C	--	--	--
Oscillatoria	--	--	--	--	--	--
Phormidium	--	4-C	--	--	--	--
Rhizoclonium	--	--	--	--	--	--
Scenedesmus	--	--	--	--	--	--
Spirogyra	--	3-C	3-VC	2-A	2-A	3-A
Spirulina	--	--	--	--	--	--
Stigeoclonium	--	--	--	--	--	--
Tribonema	--	--	--	--	--	--
Ulothrix	--	--	--	--	--	--
Vaucheria	--	--	--	--	1-VA	2-A
Total Diatom Taxa	--	50	--	--	--	--
Total Taxa Counted	--	44	--	--	--	--
Frustules Counted	--	366	--	--	--	--
Diversity	--	4.197	--	--	--	--
Equitability	--	0.61	--	--	--	--
PRA Achnanthes sp.	--	12.8	--	--	--	--
PRA Nitzschia sp.	--	39.9	--	--	--	--
PRA Major Species:						
Achnanthes minutissima	--	12.8	--	--	--	--
Cyclotella meneghiniana	--	--	--	--	--	--
Cymbella affinis	--	16.9	--	--	--	--
Diatoma tenue	--	--	--	--	--	--
Entomoneis paludosa	--	--	--	--	--	--
Gomphonema olivaceum	--	--	--	--	--	--
Navicula cincta	--	--	--	--	--	--
Nitzschia frustulum	--	20.8	--	--	--	--
Synedra fasciculata	--	--	--	--	--	--

a--Collected at T07S,R43E,17C (upstream and intermediate sampling site).
b--Collected at T06S,R43E,19D (major downstream sampling site).
c--Collected at T06S,R43E,18B (sampling site near mouth).

Table I154. Periphyton community data and major algal taxa obtained from natural substrates collected from Stroud Creek near Quietus-Decker and from Lee Creek near Quietus-Birney.

	Stroud Creek			Lee Creek
Collection Date	7/13/79	9/04/79	11/05/79	7/12/79
Sample Number	0656A	0656B	0656C	0654A
Sample Code	A	B	B	A
Rank-Abundance:				
Anabaena	5-R	--	--	6-C
Bacillariophyceae	1-A	2-VC	3-A	3-A
Chaetophora	--	--	--	1-VA
Cladophora	2-VC	--	--	--
Closterium	4-R	--	7-R	--
Mougeotia	--	--	2-VA	2-A
Oedogonium	--	--	--	5-C
Oscillatoria	--	--	6-C	--
Phormidium	3-VC	--	5-C	--
Rhizoclonium	--	--	1-VA	--
Spirogyra	--	1-A	4-VC	--
Tribonema	--	--	--	4-VC
Total Diatom Taxa	68	--	--	74
Total Taxa Counted	46	--	--	54
Frustules Counted	137	--	--	322
Diversity	4.567	--	--	4.851
Equitability	0.76	--	--	0.80
PRA Achnanthes sp.	2.2	--	--	4.6
PRA Nitzschia sp.	44.3	--	--	35.3
PRA Major Species:				
Navicula cincta	10.9	--	--	--
Nitzschia frustulum	--	--	--	10.2
Nitzschia microcephala	22.6	--	--	--
Nitzschia paleacea	--	--	--	17.4

Table I155. Periphyton community data and major algal taxa obtained from natural substrates collected from the East Fork of Hanging Woman Creek near Birney (the first page of three pages).

Collection Date	6/11/78	8/18/78	8/27/78	9/09/78	10/08/78
Sample Number	0419A	0419B	0419C	0419D	0419E
Sample Code	A	A	A	A	A
Rank-Abundance:					
Anabaena	--	--	--	--	4-R
Audouinella	4-R	4-C	2-C	--	2-VC
Bacillariophyceae	1-VA	1-A	1-A	1-VC	1-A
Chaetophora	--	--	--	--	--
Chara	--	--	--	--	--
Cladophora	2-C	2-VC	--	2-VC	--
Closterium	--	--	--	--	--
Enteromorpha	3-C	--	--	--	--
Hormidium	--	--	--	--	--
Monostroma	--	--	--	--	--
Mougeotia	--	--	--	--	--
Nostoc	--	--	--	--	--
Oedogonium	7-R	--	--	3-R	--
Oscillatoria	5-R	--	--	--	--
Phormidium	--	3-C	--	--	3-C
Rhizoclonium	--	--	--	--	--
Spirogyra	6-R	--	--	--	--
Tribonema	--	--	--	--	--
Vaucheria	--	--	--	--	--
Zygnema	--	--	--	--	--
Total Diatom Taxa	42	55	44	71	64
Total Taxa Counted	32	44	37	49	52
Frustules Counted	258	363	315	333	352
Diversity	3.153	4.362	3.824	4.628	4.240
Equitability	0.41	0.68	0.57	0.74	0.54
PRA Achnanthes sp.	6.4	15.4	15.6	20.1	16.8
PRA Nitzschia sp.	14.2	24.0	17.5	16.5	26.0
PRA Major Species:					
Achnanthes lanceolata	--	--	--	10.2	--
Achnanthes minutissima	--	--	--	--	--
Amphora perpusilla	--	--	--	--	21.3
Cocconeis placentula	--	--	12.4	11.4	--
Navicula gregaria	--	--	--	--	--
Navicula viridula	43.9	20.1	24.1	--	--
Nitzschia frustulum	--	--	--	--	17.4
Nitzschia linearis	--	--	--	--	--
Nitzschia paleacea	--	--	--	--	--
Surirella ovata	11.7	--	--	--	--

Table I155. Continued (the second page of three pages).

Collection Date	11/04/78	2/11/79	3/31/79	5/19/79	6/22/79
Sample Number	0419F	0419G	0419H	0419I	0419J
Sample Code	A	A	A	A	A
Rank-Abundance:					
Anabaena	--	--	--	--	--
Audouinella	2-VC	2-VC	--	--	--
Bacillariophyceae	1-VC	1-VA	1-A	1-A	1-VA
Chaetophora	--	--	--	--	--
Chara	--	--	--	--	--
Cladophora	--	--	--	2-A	--
Closterium	--	--	--	--	--
Enteromorpha	--	--	--	--	--
Hormidium	--	--	--	--	--
Monostroma	--	--	--	--	2-A
Mougeotia	--	--	--	--	--
Nostoc	--	--	--	--	--
Oedogonium	3-R	--	--	--	5-C
Oscillatoria	--	--	--	--	--
Phormidium	4-R	--	--	--	--
Rhizoclonium	--	--	--	--	4-VC
Spirogyra	--	--	--	--	--
Tribonema	--	--	--	4-C	--
Vaucheria	--	--	2-VC	3-C	3-VC
Zygnema	--	--	--	--	--
Total Diatom Taxa	69	39	53	70	52
Total Taxa Counted	55	33	47	52	40
Frustules Counted	351	373	380	336	329
Diversity	4.838	3.638	4.110	4.540	4.254
Equitability	0.77	0.54	0.53	0.66	0.70
PRA Achnanthes sp.	16.8	27.1	13.2	11.3	22.5
PRA Nitzschia sp.	27.7	19.0	20.2	30.2	38.9
PRA Major Species:					
Achnanthes lanceolata	--	--	--	--	10.0
Achnanthes minutissima	11.1	23.6	--	--	12.5
Amphora perpusilla	--	18.8	--	--	--
Cocconeis placentula	--	--	--	11.3	--
Navicula viridula	--	13.1	22.1	14.3	--
Nitzschia frustulum	--	--	--	--	--
Nitzschia linearis	--	--	--	11.0	--
Nitzschia paleacea	--	--	--	--	13.4
Surirella ovata	--	--	16.1	--	--

Table I155. Continued (the third page of three pages).

Collection Date	7/28/79	8/07/79	9/05/79	9/29/79	11/05/79
Sample Number	0419K	0419L	0419M	0419P	0419S
Sample Code	A	D	A	C	C
Rank-Abundance:					
Anabaena	--	--	--	--	--
Audouinella	3-VC	5-C	2-A	--	--
Bacillariophyceae	2-VC	1-A	3-VC	6-VC	4-VC
Chaetophora	--	--	--	--	5-VC
Chara	--	4-VC	--	--	--
Cladophora	--	--	4-C	5-A	3-A
Closterium	--	7-R	--	--	6-C
Enteromorpha	1-A	--	--	--	--
Hormidium	--	8-R	--	--	--
Monostroma	--	2-VC	--	--	--
Mougeotia	--	--	--	1-VA	--
Nostoc	--	3-VC	--	2-A	--
Oedogonium	--	--	--	--	--
Oscillatoria	--	--	--	--	--
Phormidium	4-C	9-R	--	--	--
Rhizoclonium	--	6-C	--	--	--
Spirogyra	--	--	--	4-A	2-VA
Tribonema	--	--	--	--	--
Vaucheria	--	--	1-A	--	--
Zygnema	--	--	--	3-A	1-VA
Total Diatom Taxa	39	53	51	--	--
Total Taxa Counted	28	53*	38	--	--
Frustules Counted	349	387*	326	--	--
Diversity	2.146	4.386	4.034	--	--
Equitability	0.21	0.58	0.63	--	--
PRA Achnanthes sp.	70.5	30.3	34.4	--	--
PRA Nitzschia sp.	14.6	21.5	14.4	--	--
PRA Major Species:					
Achnanthes lanceolata	--	--	11.7	--	--
Achnanthes minutissima	68.2	22.3	22.7	--	--
Amphora perpusilla	--	--	--	--	--
Cocconeis placentula	--	--	13.8	--	--
Navicula gregaria	--	10.8	--	--	--
Navicula viridula	--	--	--	--	--
Nitzschia frustulum	--	11.0	--	--	--
Nitzschia linearis	--	--	--	--	--
Nitzschia paleacea	--	--	--	--	--
Surirella ovata	--	--	--	--	--

*For the "semi-detailed" analysis, 118 diatom taxa and 11,997 frustules were counted.

Table I156. Periphyton community data and major algal taxa obtained from natural substrates collected from Bear Creek near Otter and from Cow Creek near Otter-Fort Howe.

	Bear Creek		Cow Creek		
Collection Date	7/12/79	9/30/79	6/27/79	7/31/79	8/31/79
Sample Number	0652A	0652B	0644A	0644B	0644C
Sample Code	A	B	B	B	A
Rank-Abundance:					
Agmenellum	5-R	--	--	--	--
Bacillariophyceae	2-A	1-VA	2-VC	1-A	1-VA
Cladophora	3-VC	--	--	--	--
Closterium	--	4-R	--	--	--
Mougeotia	--	2-C	--	--	--
Nostoc	--	--	1-A	2-VC	2-VA
Phormidium	--	--	--	3-C	--
Scenedesmus	4-C	--	--	--	--
Spirogyra	1-VA	--	--	--	--
Stigeoclonium	--	3-C	--	--	--
Total Diatom Taxa	44	--	--	--	61
Total Taxa Counted	28	--	--	--	49
Frustules Counted	359	--	--	--	366
Diversity	2.972	--	--	--	4.351
Equitability	0.39	--	--	--	0.61
PRA Achnanthes sp.	39.8	--	--	--	20.7
PRA Nitzschia sp.	5.6	--	--	--	29.7
PRA Major Species:					
Achnanthes minutissima	39.8	--	--	--	11.2
Cocconeis placentula	--	--	--	--	15.0
Nitzschia palea	--	--	--	--	12.8
Synedra famelica	22.3	--	--	--	--

Table I157. Periphyton community data and major algal taxa obtained from natural substrates collected from upper Otter Creek near Otter-Fort Howe.

Collection Date	7/07/78	8/29/78	6/27/79	7/31/79	9/30/79a	9/30/79b
Sample Number	0523A	0523B	0523C	0523D	0694A	0523E
Sample Code	B	A	B	B	B	B
Rank-Abundance:						
Audouinella	--	--	3-VC	3-VC	--	--
Bacillariophyceae	3-A	3-A	2-VC	1-VA	1-VA	1-VA
Cladophora	1-VA	1-VA	1-VA	4-C	--	2-A
Closterium	5-C	--	--	--	--	--
Oscillatoria	--	--	--	--	2-C	4-VC
Phormidium	--	--	--	2-A	--	--
Rhizoclonium	4-C	--	--	--	--	--
Scenedesmus	--	--	--	--	--	5-R
Spirogyra	2-A	--	--	--	--	--
Spirulina	--	--	--	--	--	6-R
Stigeoclonium	--	--	--	--	--	3-VC
Vaucheria	--	2-A	--	--	--	--
Total Diatom Taxa	--	68	--	--	--	--
Total Taxa Counted	--	60	--	--	--	--
Frustules Counted	--	387	--	--	--	--
Diversity	--	4.751	--	--	--	--
Equitability	--	0.67	--	--	--	--
PRA Achnanthes sp.	--	18.4	--	--	--	--
PRA Nitzschia sp.	--	14.6	--	--	--	--
PRA Major Species:						
Achnanthes minutissima	--	15.8	--	--	--	--
Pleurosigma delicatulum	--	13.4	--	--	--	--

a--Collected at T08S,R46E,05C (upstream sampling site above Bear Creek).
b--Collected at T07S,R45E,13D (major upstream sampling site).

Table I158. Periphyton community data and major algal taxa obtained from natural substrates collected from lower Otter Creek near Ashland (the first page of three pages).

Collection Date	6/15/78	7/05/78	7/21/78	7/31/78	9/04/78
Sample Number	0423A	0423B	0423C	0423D	0423H
Sample Code	A	A	A	A	A
Rank-Abundance:					
Ankistrodesmus	--	--	--	--	--
Audouinella	--	--	--	--	--
Bacillariophyceae	1-A	2-A	2-VC	2-VC	2-VC
Cladophora	--	1-VA	1-VA	1-VA	1-VA
Closterium	--	--	--	--	--
Euglena	--	4-R	--	--	--
Lyngbya	--	--	--	--	--
Microthamnion	--	--	--	--	--
Mougeotia	--	--	--	--	--
Oedogonium	3-A	--	--	--	--
Oscillatoria	4-R	--	--	--	--
Phormidium	--	--	4-R	--	3-VC
Rhizoclonium	5-R	3-R	3-R	--	--
Scenedesmus	--	--	--	--	--
Spirogyra	2-A	--	--	--	--
Spirulina	--	--	--	--	4-C
Stigeoclonium	--	--	--	--	--
Total Diatom Taxa	53	37	43	32	49
Total Taxa Counted	48	36	38	26	45
Frustules Counted	317	315	337	359	323
Diversity	4.520	4.227	3.782	2.888	4.331
Equitability	0.71	0.75	0.53	0.38	0.67
PRA Achnanthes sp.	4.1	7.0	10.7	41.5	15.5
PRA Nitzschia sp.	36.1	30.9	27.0	23.8	36.5
PRA Major Species:					
Achnanthes minutissima	--	--	10.7	41.5	15.5
Cyclotella meneghiniana	11.4	--	--	--	--
Cymbella affinis	--	--	--	--	--
Cymbella cymbiformis	--	--	--	--	--
Diatoma tenue	--	--	--	--	--
Gomphonema olivaceum	--	--	--	--	--
Navicula cincta	17.3	10.1	--	--	12.3
Nitzschia frustulum	--	12.0	16.0	15.9	--
Nitzschia longissima	--	--	--	--	13.9
Nitzschia palea	10.1	--	--	--	--
Rhoicosphenia curvata	--	--	27.3	17.5	--
Thalassiosira pseudonana	--	14.9	--	--	--

Table I158. Continued (the second page of three pages).

Collection Date	10/08/78	11/05/78	2/11/79	3/31/79	5/20/79
Sample Number	0423K	0423L	0423Ø	0423P	0423Q
Sample Code	A	A	A	B	A
Rank-Abundance:					
Ankistrodesmus	--	--	5-R	--	--
Audouinella	--	--	3-C	--	--
Bacillariophyceae	1-VA	1-VA	1-VA	1-C	2-A
Cladophora	2-VA	2-A	2-VC	--	1-VA
Closterium	--	--	--	--	--
Euglena	--	--	--	--	--
Lyngbya	--	--	--	--	--
Microthamnion	--	--	--	--	--
Mougeotia	--	--	--	--	--
Oedogonium	--	--	--	--	--
Oscillatoria	--	--	--	--	--
Phormidium	--	--	4-R	--	--
Rhizoclonium	--	--	--	--	--
Scenedesmus	--	--	--	--	--
Spirogyra	--	--	--	--	--
Spirulina	--	--	--	--	--
Stigeoclonium	--	--	--	--	--
Total Diatom Taxa	44	43	46	--	41
Total Taxa Counted	38	30	33	--	30
Frustules Counted	350	339	343	--	365
Diversity	3.714	3.010	2.965	--	2.942
Equitability	0.50	0.37	0.33	--	0.37
PRA Achnanthes sp.	24.0	2.4	15.5	--	2.7
PRA Nitzschia sp.	10.9	3.0	4.8	--	7.4
PRA Major Species:					
Achnanthes minutissima	23.7	--	15.5	--	--
Cyclotella meneghiniana	--	--	--	--	--
Cymbella affinis	--	17.4	--	--	10.4
Cymbella cymbiformis	--	29.5	--	--	--
Diatoma tenue	25.1	22.7	43.1	--	41.9
Gomphonema olivaceum	--	12.4	17.8	--	--
Navicula cincta	--	--	--	--	--
Nitzschia frustulum	--	--	--	--	--
Nitzschia longissima	--	--	--	--	--
Nitzschia palea	--	--	--	--	--
Rhoicosphenia curvata	--	--	--	--	--
Thalassiosira pseudonana	--	--	--	--	22.5

Table I158. Continued (the third page of three pages).

Collection Date	7/17/79	8/07/79	9/29/79a	9/30/79b	9/30/79a
Sample Number	0423S	0423T	0423V	0695A	0423W
Sample Code	C	D	C	B	A
Rank-Abundance:					
Ankistrodesmus	--	--	--	--	--
Audouinella	--	--	--	3-A	2-VC
Bacillariophyceae	2-VC	1-VA	2-A	1-VA	1-VA
Cladophora	--	2-A	1-VA	2-A	--
Closterium	--	--	--	8-R	--
Euglena	--	--	--	--	--
Lyngbya	--	--	--	7-C	--
Microthamnion	--	7-R	--	--	--
Mougeotia	--	6-C	--	4-A	7-R
Oedogonium	--	--	--	--	--
Oscillatoria	1-A	4-VC	4-C	6-VC	6-C
Phormidium	--	--	--	5-A	5-C
Rhizoclonium	--	5-C	--	--	3-VC
Scenedesmus	--	--	--	9-R	--
Spirogyra	--	3-VC	3-A	--	--
Spirulina	--	--	5-R	10-R	--
Stigeoclonium	--	--	--	--	4-C
Total Diatom Taxa	--	40	--	--	47
Total Taxa Counted	--	40*	--	--	28
Frustules Counted	--	699*	--	--	391
Diversity	--	2.955	--	--	3.802
Equitability	--	0.28	--	--	0.71
PRA Achnanthes sp.	--	3.3	--	--	6.6
PRA Nitzschia sp.	--	44.0	--	--	63.1
PRA Major Species:					
Achnanthes minutissima	--	--	--	--	--
Cyclotella meneghiniana	--	--	--	--	--
Cymbella affinis	--	--	--	--	--
Cymbella cymbiformis	--	--	--	--	--
Diatoma tenue	--	--	--	--	--
Gomphonema olivaceum	--	--	--	--	--
Navicula cincta	--	43.7	--	--	--
Nitzschia frustulum	--	23.6	--	--	45.2
Nitzschia longissima	--	--	--	--	--
Nitzschia palea	--	--	--	--	--
Rhoicosphenia curvata	--	--	--	--	--
Thalassiosira pseudonana	--	--	--	--	--

*For the semi-detailed analysis, 112 diatom taxa and 31,455 frustules were counted.

a--Collected at TO3S,R44E,12C (major downstream sampling site).
b--Collected at TO5S,R45E,11C (upstream and intermediate sampling site).

Table I159. Periphyton community data and major algal taxa obtained from natural substrates collected from Pumpkin Creek near Miles City (the first page of two pages).

Collection Date	6/15/78	7/05/78	7/21/78	7/31/78	9/06/78
Sample Number	0421A	0421B	0421C	0421D	0421F
Sample Code	A	B	A	A	A
Rank-Abundance:					
Anabaena	6-R	--	--	--	--
Ankistrodesmus	--	--	--	--	--
Bacillariophyceae	1-C	1-C	2-C	3-C	2-C
Chara	--	--	--	--	--
Cladophora	--	--	--	2-VC	1-VC
Cosmarium	4-R	--	--	--	--
Oedogonium	--	--	--	--	--
Oscillatoria	--	--	--	--	--
Phormidium	--	--	3-R	--	3-C
Rhizoclonium	--	--	1-VC	--	--
Spirogyra	--	--	--	--	--
Stigeoclonium	2-R	--	--	--	--
Tribonema	3-R	--	--	1-A	--
Ulothrix	5-R	--	--	--	--
Total Diatom Taxa	22	--	18	25	39
Total Taxa Counted	20	--	17	25	38
Frustules Counted	324	--	317	337	336
Diversity	2.870	--	1.723	1.874	4.190
Equitability	0.50	--	0.24	0.20	0.71
PRA Achnanthes sp.	0.0	--	0.9	0.0	0.9
PRA Nitzschia sp.	61.7	--	73.8	74.5	59.5
PRA Major Species:					
Achnanthes minutissima	--	--	--	--	--
Amphora veneta	--	--	15.8	10.4	--
Gomphonema angustatum	--	--	--	--	--
Navicula cincta	--	--	--	--	--
Navicula pavillardii	--	--	--	--	--
Nitzschia communis	--	--	--	--	13.7
Nitzschia frustulum	--	--	68.8	69.7	--
Nitzschia kutzingiana	--	--	--	--	12.8
Nitzschia longissima	--	--	--	--	--
Nitzschia palea	43.2	--	--	--	--
Nitzschia paleacea	--	--	--	--	--

Table I159. Continued (the second page of two pages).

Collection Date	10/09/78	5/12/79	8/09/79	11/07/79
Sample Number	0421I	0421J	0421K	0421M
Sample Code	A	A	D	A
Rank-Abundance:				
Anabaena	--	--	--	--
Ankistrodesmus	4-R	--	--	--
Bacillariophyceae	1-VC	1-VC	1-A	1-VC
Chara	--	--	3-VC	--
Cladophora	--	--	--	--
Cosmarium	--	--	--	--
Oedogonium	2-R	--	--	--
Oscillatoria	--	--	--	2-C
Phormidium	3-R	2-C	--	--
Rhizoclonium	--	--	--	--
Spirogyra	--	--	2-A	--
Stigeoclonium	--	--	--	--
Tribonema	--	--	--	--
Ulothrix	--	--	--	--
Total Diatom Taxa	45	28	36	28
Total Taxa Counted	41	28	36*	27
Frustules Counted	408	137	329*	138
Diversity	4.202	3.768	4.118	3.467
Equitability	0.66	0.71	0.71	0.59
PRA Achnanthes sp.	2.9	0.0	12.7	0.0
PRA Nitzschia sp.	49.4	67.7	37.3	57.0
PRA Major Species:				
Achnanthes minutissima	--	--	12.7	--
Amphora veneta	--	--	--	--
Gomphonema angustatum	15.2	--	--	--
Navicula cincta	12.0	--	--	--
Navicula pavillardi	--	--	19.3	--
Nitzschia communis	--	--	--	--
Nitzschia frustulum	19.3	13.9	--	--
Nitzschia kutzingiana	--	--	--	--
Nitzschia longissima	--	--	10.0	40.6
Nitzschia palea	--	--	--	--
Nitzschia paleacea	--	29.9	--	--

*For the "semi-detailed" analysis, 84 diatom taxa and 13,818 frustules were counted.

Table I160. Periphyton community data and major algal taxa obtained from natural substrates collected from Mizpah Creek near Mizpah (the first page of two pages).

Collection Date	6/15/78	7/05/78	7/21/78	7/31/78	9/06/78
Sample Number	0422A	0422B	0422C	0422D	0422F
Sample Code	A	A	B	A	A
Rank-Abundance:					
Anabaena	--	--	--	--	--
Ankistrodesmus	--	--	--	--	--
Bacillariophyceae	2-C	3-C	2-C	2-C	2-A
Chara	--	--	--	--	--
Cladophora	--	1-VA	1-A	--	--
Closterium	--	--	--	--	4-C
Oedogonium	--	--	--	--	--
Phormidium	--	--	3-R	--	3-VC
Rhizoclonium	--	2-VC	--	1-VA	1-VA
Rivularia	1-VC	--	--	--	--
Spirogyra	--	--	--	--	--
Spirulina	--	--	--	--	5-R
Total Diatom Taxa	16	18	--	25	46
Total Taxa Counted	15	18	--	23	39
Frustules Counted	115	100	--	128	338
Diversity	2.602	2.571	--	3.830	4.367
Equitability	0.53	0.44	--	0.91	0.77
PRA Achnanthes sp.	7.8	0.0	--	0.0	0.0
PRA Nitzschia sp.	78.3	66.0	--	48.5	46.0
PRA Major Species:					
Amphipleura pellucida	--	--	--	--	10.7
Cymbella pusilla	--	--	--	--	--
Navicula cincta	--	--	--	17.2	17.2
Navicula odiosa	--	--	--	--	--
Navicula pavillardii	--	--	--	--	--
Nitzschia amphibia	15.7	--	--	--	--
Nitzschia frustulum	51.3	59.0	--	17.2	--
Nitzschia paleacea	--	--	--	--	--
Nitzschia valdestriata	--	--	--	13.3	--

Table I160. Continued (the second page of two pages).

Collection Date	10/09/78	5/12/79	8/09/79	11/07/79
Sample Number	0422I	0422J	0422K	0422M
Sample Code	A	A	D	A
Rank-Abundance:				
Anabaena	--	--	7-R	--
Ankistrodesmus	--	3-R	--	--
Bacillariophyceae	1-VC	1-C	1-A	2-C
Chara	--	--	4-C	--
Cladophora	--	--	--	--
Closterium	--	--	--	--
Oedogonium	--	--	5-C	--
Phormidium	2-R	2-C	3-A	--
Rhizoclonium	--	--	2-A	--
Rivularia	--	--	--	--
Spirogyra	--	--	--	1-A
Spirulina	--	--	6-R	--
Total Diatom Taxa	42	29	51	49
Total Taxa Counted	38	29	51*	44
Frustules Counted	346	136	630*	408
Diversity	4.256	2.884	4.259	4.315
Equitability	0.74	0.34	0.55	0.66
PRA Achnanthes sp.	0.0	0.0	trace	1.0
PRA Nitzschia sp.	42.3	78.5	43.5	35.1
PRA Major Species:				
Amphipleura pellucida	--	--	--	--
Cymbella pusilla	--	--	--	12.0
Navicula cincta	22.9	--	14.1	30.4
Navicula odiosa	11.8	--	--	--
Navicula pavillardii	--	--	18.5	--
Nitzschia amphibia	--	--	--	--
Nitzschia frustulum	--	--	17.6	--
Nitzschia paleacea	--	55.9	--	--
Nitzschia valdestriata	--	--	--	--

*For the "semi-detailed" analysis, 97 diatom taxa and 20,160 frustules were counted.

Table I161. Periphyton community data and major algal taxa obtained from natural substrates collected from the East and West Forks of Armells Creek near Colstrip and from main Armells Creek near Colstrip.

	East Fork Armells			West Fork Armells				Main Armells
Collection Date	8/24/78	6/13/79	7/24/79	5/28/78	8/24/78	6/13/79	7/03/79	6/13/79
Sample Number	0531A	0531C	0531D	0414A	0414B	0414C	0414D	0532C
Sample Code	B	B	A	A	A	B	B	B
Rank-Abundance:								
Anabaena	--	9-R	--	--	--	--	--	--
Bacillariophyceae	2-VC	4-C	3-VC	1-C	1-VC	2-C	3-VC	3-C
Chaetophora	--	1-A	--	--	--	--	--	--
Cladophora	--	--	1-A	--	--	--	--	--
Closterium	--	7-R	--	--	--	--	6-R	--
Lyngbya	--	--	2-C	--	--	--	--	--
Microspora	--	--	--	--	--	--	2-A	--
Mougeotia	--	6-C	--	--	--	--	--	--
Nostoc	--	--	7-R	--	--	--	--	--
Oedogonium	--	3-VC	4-C	--	--	--	5-C	--
Oscillatoria	--	--	6-R	--	2-C	--	--	4-R
Phormidium	4-C	5-C	5-VC	-	--	--	--	--
Rhizoclonium	--	--	--	--	--	1-VA	1-VA	1-VA
Rivularia	3-VC	2-VC	--	--	--	--	--	--
Stigeoclonium	1-VC	--	--	--	--	--	--	--
Tribonema	--	8-R	--	--	--	--	4-C	--
Vaucheria	--	--	--	--	--	--	--	2-A
Total Diatom Taxa	--	--	34	37	49	--	--	--
Total Taxa Counted	--	--	29	33	35	--	--	--
Frustules Counted	--	--	372	122	153	--	--	--
Diversity	--	--	3.602	4.111	4.109	--	--	--
Equitability	--	--	0.60	0.76	0.71	--	--	--
PRA Achnanthes sp.	--	--	0.0	2.5	3.9	--	--	--
PRA Nitzschia sp.	--	--	22.6	54.8	48.0	--	--	--
PRA Major Species:								
Cocconeis placentula	--	--	18.8	--	--	--	--	--
Synedra fasciculata	--	--	17.7	--	--	--	--	--
Nitzschia frustulum	--	--	18.2	31.1	--	--	--	--
Nitzschia longissima	--	--	--	--	28.1	--	--	--

Table I162. Periphyton community data and major algal taxa obtained from natural substrates collected from lower Armells Creek near Forsyth.

Collection Date	8/24/78x	5/13/79	7/03/79	9/21/79	11/07/79
Sample Number	0532A	0532B	0532D	0532E	0532F
Sample Code	A	B	B	B	B
Rank-Abundance:					
Bacillariophyceae	1-VA	1-VA	1-VA	1-VA	1-A
Chroococcus	--	--	--	--	6-R
Cladophora	--	2-A	--	--	--
Closterium	3-R	--	--	--	--
Cosmarium	4-R	--	--	--	--
Enteromorpha	--	--	--	4-VC	--
Hormidium	--	--	--	8-C	--
Mougeotia	--	--	--	5-VC	2-VC
Oedogonium	--	--	--	7-C	5-C
Oscillatoria	2-C	--	--	6-C	--
Schizomeris	--	--	2-A	--	4-VC
Spirogyra	--	--	--	2-A	3-VC
Zygnema	--	--	--	3-A	--
Total Diatom Taxa	62	--	--	--	--
Total Taxa Counted	41	--	--	--	--
Frustules Counted	377	--	--	--	--
Diversity	3.971	--	--	--	--
Equitability	0.56	--	--	--	--
PRA Achnanthes sp.	4.8	--	--	--	--
PRA Nitzschia sp.	29.3	--	--	--	--
PRA Major Species:					
Cymbella affinis	29.7	--	--	--	--

xLower Armells Creek probably affected by Yellowstone River irrigation return flows on this sampling date.

Table I163. Periphyton community data and major algal taxa obtained from natural substrates collected from Sweeney Creek near Rosebud.

Collection Date	5/28/78	7/12/78	8/23/78	5/13/79	8/21/79	11/07/79
Sample Number	0415A	0415B	0415C	0415D	0415E	0415F
Sample Code	A	B	A	B	B	B
Rank-Abundance:						
Ankistrodesmus	2-R	--	--	2-R	--	--
Bacillariophyceae	1-A	2-A	1-A	1-A	2-A	3-A
Calothrix	--	--	--	--	--	4-C
Mougeotia	--	3-VC	5-C	--	--	--
Oedogonium	--	4-R	6-R	--	--	--
Oscillatoria	--	--	3-VC	--	1-A	5-C
Spirogyra	--	1-VA	2-VC	--	--	1-VA
Tribonema	--	5-R	--	--	--	--
Zygnema	--	--	7-R	--	--	--
Total Diatom Taxa	43	--	65	--	--	--
Total Taxa Counted	36	--	52	--	--	--
Frustules Counted	361	--	371	--	--	--
Diversity	2.851	--	4.518	--	--	--
Equitability	0.28	--	0.65	--	--	--
PRA Achnanthes sp.	55.4	--	21.8	--	--	--
PRA Nitzschia sp.	18.4	--	31.2	--	--	--
PRA Major Species:						
Achnanthes minutissima	54.8	--	21.3	--	--	--
Nitzschia frustulum	11.9	--	11.6	--	--	--

Table I164. Periphyton community data and major algal taxa obtained from natural substrates collected from Reservation Creek near Forsyth-Hysham.

Collection Date	5/28/78	7/12/78	8/22/78	8/24/78	5/13/79	8/22/79	9/21/79
Sample Number	0416A	0416B	0416D	0416C	0416E	0416F	0416G
Sample Code	A	B	B	A	B	B	C
Rank-Abundance:							
Anabaena	--	--	5-C	--	--	--	--
Bacillariophyceae	1-VC	3-VC	3-A	1-VA	2-VA	7-C	2-C
Cladophora	--	--	4-C	--	1-VA	--	--
Closterium	--	--	6-R	--	--	--	--
Enteromorpha	--	--	--	--	--	2-VA	--
Lyngbya	--	--	--	--	--	6-VC	--
Oedogonium	--	4-VC	--	--	--	4-A	--
Oscillatoria	--	--	--	--	--	8-C	--
Rhizoclonium	--	1-VA	--	--	--	3-A	--
Spirogyra	--	--	2-VA	--	--	5-VC	--
Tribonema	--	5-C	--	3-A	3-C	--	--
Vaucheria	--	2-A	1-VA	2-A	--	1-VA	1-VA
Total Diatom Taxa	48	--	--	64	--	--	--
Total Taxa Counted	37	--	--	47	--	--	--
Frustules Counted	331	--	--	338	--	--	--
Diversity	4.000	--	--	4.377	--	--	--
Equitability	0.62	--	--	0.66	--	--	--
PRA Achnanthes sp.	6.6	--	--	0.9	--	--	--
PRA Nitzschia sp.	18.1	--	--	23.8	--	--	--
PRA Major Species:							
Navicula cincta	11.8	--	--	18.7	--	--	--
Nitzschia frustulum	10.3	--	--	15.1	--	--	--
Surirella ovata	28.1	--	--	--	--	--	--
Synedra famelica	--	--	--	13.0	--	--	--

Table I165. Periphyton community data and major algal taxa obtained from natural substrates collected from Sarpy Creek near Hysham and from the Powder River near Moorhead.

	Sarpy Creek						Powder River
Collection Date	7/12/78	8/22/78	8/24/78x	5/13/79	8/22/79	11/07/79	9/14/79
Sample Number	0527A	0527C	0527B	0527D	0527E	0527F	0691A
Sample Code	B	B	A	B	B	B	A
Rank-Abundance:							
Audouinella	3-C	--	--	--	--	--	4-C
Bacillariophyceae	2-A	3-VC	1-VA	1-A	2-VC	1-VA	1-A
Cladophora	1-VA	--	2-VC	--	--	2-A	--
Enteromorpha	--	1-VA	--	--	1-VA	--	--
Euglena	--	--	--	2-R	--	--	--
Oscillatoria	--	--	--	--	--	5-C	--
Phormidium	4-R	--	3-C	--	--	3-VC	3-VC
Rhizoclonium	--	2-A	--	--	--	--	
Spirogyra	--	--	--	--	--	4-C	--
Stigeoclonium	--	--	4-C	--	--	--	--
Vaucheria	--	--	--	--	--	--	2-A
Total Diatom Taxa	--	--	35	--	--	--	50
Total Taxa Counted	--	--	27	--	--	--	45
Frustules Counted	--	--	356	--	--	--	167
Diversity	--	--	2.694	--	--	--	4.708
Equitability	--	--	0.33	--	--	--	0.87
PRA Achnanthes sp.	--	--	5.3	--	--	--	2.4
PRA Nitzschia sp.	--	--	51.6	--	--	--	31.8
PRA Major Species:							
Navicula cincta	--	--	--	--	--	--	10.2
Navicula odiosa	--	--	--	--	--	--	12.6
Nitzschia frustulum	--	--	58.7	--	--	--	--
Nitzschia palea	--	--	--	--	--	--	10.8

xLower Sarpy Creek probably affected by Yelowstone River irrigation return flows on this sampling date.

Table J166. Periphyton community data and major algal taxa collected from artificial substrates placed into the upper Rosebud Creek near Kirby and the Tongue River near Pyramid Butte-Birney stations.

	Rosebud Creek			Tongue River		
Collection Date	8/18/78	8/29/78	11/05/78	8/27/78	10/08/78	11/04/78
Sample Number	0425E	0425F	0425K	0364F	0364H	0364K
Sample Code	E	E	E	E	E	E
Rank-Abundance:						
Agmenellum	--	--	--	--	--	4-R
Bacillariophyceae	1-VA	1-VA	1-VA	1-A	1-VA	1-VA
Mougeotia	--	--	--	--	3-R	2-A
Peridinium	--	--	--	2-R	--	--
Phormidium	2-R	--	--	--	2-VC	3-VC
Stigeoclonium	--	2-VC	--	--	--	--
Total Diatom Taxa	41	41	41	42	44	45
Total Taxa Counted	30	34	28	31	37	40
Frustules Counted	358	346	342	353	350	341
Diversity	3.388	3.784	3.060	3.715	4.102	3.879
Equitability	0.50	0.59	0.43	0.61	0.68	0.52
PRA Achnanthes sp.	1.7	6.6	2.0	19.9	14.3	25.2
PRA Nitzschia sp.	7.6	10.2	6.5	4.3	18.1	41.2
PRA Major Species:						
Achnanthes minutissima	--	--	--	19.3	13.7	25.2
Cocconeis pediculus	--	--	--	17.6	15.1	--
Cymbella affinis	--	26.9	--	--	--	--
Diatoma vulgare	37.4	--	--	--	--	--
Gomphonema olivaceum	--	--	28.0	--	--	--
Gomphonema tenellum	--	--	--	17.0	--	--
Navicula tripunctata	11.7	16.2	--	--	--	--
Navicula viridula	--	--	24.3	--	--	--
Nitzschia acicularis	--	--	--	--	--	10.9
Nitzschia dissipata	--	--	--	--	14.3	16.7

Table J167. Periphyton community data and major algal taxa collected from artificial substrates placed into the Squirrel Creek near Decker station.

Collection Date	8/17/79	9/05/79	9/15/79	9/28/79	10/18/79	11/01/79	11/06/79
Sample Number	0418I	0418K	0418L	0418M	0418P	0418Q	0418S
Sample Code	E	E	E	E	E	E	E
Rank-Abundance:							
Bacillariophyceae	1-VA	2-A	1-A	1-A	1-A	1-VA	1-VA
Cladophora	--	--	2-VC	--	--	--	5-C
Hormidium	--	--	--	--	3-VC	--	--
Mougeotia	--	--	--	--	--	--	2-VC
Oedogonium	3-VC	3-VC	3-VC	2-A	2-A	5-C	3-VC
Oscillatoria	--	4-C	--	5-C	--	--	--
Phormidium	--	--	6-C	--	5-C	2-VC	4-C
Rhizoclonium	--	--	--	--	--	4-C	--
Spirogyra	2-VA	1-A	4-VC	3-VC	4-C	3-VC	--
Stigeoclonium	4-R	--	--	4-C	--	--	--
Total Diatom Taxa	56	50	53	45	47	47	50
Total Taxa Counted	37	39	41	40	42	36	46
Frustules Counted	355	354	334	395	338	323	329
Diversity	4.060	3.106	3.802	4.039	4.170	3.951	4.304
Equitability	0.66	0.31	0.49	0.60	0.63	0.64	0.63
PRA Achnanthes sp.	0.6	trace	0.6	3.8	24.6	7.7	13.4
PRA Nitzschia sp.	56.6	63.7	55.4	61.4	38.9	53.5	51.9
PRA Major Species:							
Achnanthes minutissima	--	--	--	--	24.6	--	12.5
Navicula cryptocephala	15.5	--	--	--	--	--	--
Nitzschia dissipata	17.7	--	--	--	--	--	--
Nitzschia filiformis	--	--	--	--	--	29.1	--
Nitzschia frustulum	20.3	--	--	--	--	--	22.2
Nitzschia longissima	--	52.3	27.1	27.1	--	--	--

Table J168. Periphyton community data and major algal taxa collected from artificial substrates placed into the upper Hanging Woman Creek near Quietus-Decker and the lower Hanging Woman Creek near Birney stations.

	Upper Hanging Woman Creek				Lower Hanging Woman Creek			
Collection Date	8/26/78	9/09/78	10/07/78	11/04/78	8/27/78	9/09/78	10/07/78	11/04/78
Sample Number	0424E	0424H	0424I	0424L	0426E	0426H	0426I	0426L
Sample Code	E	E	E	E	E	E	E	E
Rank-Abundance:								
Ankistrodesmus	--	--	--	--	--	--	--	4-R
Bacillariophyceae	1-A	1-C	1-VA	1-VA	1-VC	1-VC	1-A	1-A
Hormidium	--	--	--	4-C	--	--	--	--
Mougeotia	--	--	--	6-R	--	--	--	--
Oedogonium	--	--	3-C	2-VC	--	--	--	--
Oscillatoria	--	--	--	--	--	--	2-R	--
Phormidium	--	--	--	5-R	--	--	--	--
Planktosphaeria	--	--	--	--	--	--	--	3-R
Scenedesmus	--	--	--	--	--	2-R	--	2-C
Sphaerocystis	--	--	--	--	--	3-R	--	--
Spirogyra	--	--	4-R	--	--	--	--	--
Spirulina	--	--	--	--	--	--	--	5-R
Stigeoclonium	--	--	2-VC	3-C	--	--	--	--
Total Diatom Taxa	54	60	63	74	68	63	70	78
Total Taxa Counted	42	47	54	57	61	52	57	62
Frustules Counted	351	335	368	328	379	328	351	400
Diversity	4.403	4.363	4.539	5.058	4.718	4.659	4.656	4.829
Equitability	0.74	0.64	0.64	0.88	0.64	0.72	0.66	0.68
PRA Achnanthes sp.	5.1	5.4	3.0	11.6	6.1	5.2	6.3	12.5
PRA Nitzschia sp.	43.4	32.3	41.0	34.7	27.4	23.6	26.6	25.2
PRA Major Species:								
Achnanthes minutissima	--	--	--	10.1	--	--	--	11.5
Cocconeis placentula	13.1	--	--	--	--	--	--	--
Cyclotella meneghiniana	--	--	--	--	24.8	22.6	22.5	14.5
Diploneis puella	--	25.4	23.6	14.6	--	--	--	--
Nitzschia dissipata	18.0	--	--	--	--	--	--	--
Nitzschia frustulum	--	14.3	16.1	14.3	--	--	--	--
Nitzschia palea	14.8	--	--	--	--	--	--	--

Table J169. Periphyton community data and major algal taxa collected from artificial substrates placed into the East Fork of Hanging Woman Creek near Birney and the lower Otter Creek near Ashland stations.

	East Fork Hanging Woman Creek				Otter Creek				
Collection Date	9/05/79	9/29/79	10/19/79a	11/05/79	8/19/78	8/27/78	9/04/78	10/08/78	11/05/78
Sample Number	0419N	0419Ø	0419Q	0419R	0423E	0423F	0423I	0423J	0423M
Sample Code	E	E	E	E	E	E	E	E	E
Rank-Abundance:									
Bacillariophyceae	1-C	1-C	1-C	1-C	1-A	1-A	1-VC	1-A	1-VA
Euglena	--	--	--	--	--	--	--	--	3-R
Mougeotia	--	--	2-R	--	--	--	--	--	--
Oedogonium	--	--	--	--	--	3-R	--	2-VC	--
Oscillatoria	--	--	--	--	2-VC	2-R	--	4-C	--
Phormidium	--	--	--	--	--	--	2-C	5-R	--
Scenedesmus	--	--	--	--	--	--	--	--	4-R
Spirogyra	--	--	--	--	--	4-R	--	3-C	2-R
Total Diatom Taxa	6	11	18	21	41	38	43	45	42
Total Taxa Counted	4	8	7	15	35	30	37	40	36
Frustules Counted	268	377	343	332	349	363	324	380	333
Diversity	0.650	0.260	0.235	0.550	3.842	3.218	3.931	3.331	3.520
Equitability	0.50	0.12	0.14	0.13	0.60	0.43	0.59	0.35	0.47
PRA Achnanthes sp.	11.7	1.6	1.8	1.2	14.6	36.1	26.2	48.9	4.5
PRA Nitzschia sp.	trace	0.9	0.0	1.8	52.5	18.2	21.7	15.1	7.5
PRA Major Species:									
Achnanthes minutissima	--	--	--	--	14.6	31.4	26.2	48.9	--
Cocconeis placentula	88.0	97.1	97.4	94.0	--	--	--	--	--
Cymbella affinis	--	--	--	--	--	--	--	--	14.7
Cymbella cymbiformis	--	--	--	--	--	--	--	--	16.2
Diatoma tenue	--	--	--	--	--	--	--	--	27.6
Navicula cincta	--	--	--	--	11.5	28.6	14.8	--	--
Nitzschia frustulum	--	--	--	--	11.2	11.6	--	--	--
Nitzschia longissima	--	--	--	--	25.5	--	--	--	--

a--Collected at TO6S,R43E,20DA.

Table J170. Periphyton community data and major algal taxa collected from artificial substrates placed into the Pumpkin Creek near Miles City and the Mizpah Creek near Mizpah stations.

	Pumpkin Creek				Mizpah Creek			
Collection Date	8/19/78	9/06/78	10/09/78	8/21/79	8/19/78	9/06/78	10/09/78	8/21/79
Sample Number	0421E	0421G	0421H	0421L	0422E	0422G	0422H	0422L
Sample Code	E	E	E	E	E	E	E	E
Rank-Abundance:								
Anabaena	2-R	5-R	--	--	--	2-R	--	--
Bacillariophyceae	1-A	1-VC	1-VC	1-VC	1-VC	1-VC	1-C	1-VC
Cosmarium	4-R	--	--	--	--	--	--	--
Mougeotia	--	--	--	--	--	3-R	--	--
Oedogonium	5-R	2-C	--	--	--	--	--	--
Phormidium	--	--	2-C	2-C	--	--	3-R	--
Rhizoclonium	--	--	--	--	--	--	2-R	--
Sphaerocystis	--	4-R	--	--	--	--	--	--
Spirulina	3-R	3-C	3-C	3-C	--	--	--	2-C
Total Diatom Taxa	67	70	49	49	53	60	50	41
Total Taxa Counted	59	58	43	32	51	51	44	31
Frustules Counted	333	342	372	145	359	337	329	161
Diversity	4.589	4.867	4.636	4.369	4.733	4.037	4.655	3.856
Equitability	0.60	0.74	0.86	0.97	0.77	0.47	0.84	0.68
PRA Achnanthes sp.	21.0	14.9	0.8	1.4	2.5	0.0	0.6	0.0
PRA Nitzschia sp.	30.9	39.5	52.9	51.1	24.8	27.5	37.5	47.8
PRA Major Species:								
Achnanthes minutissima	20.1	14.6	--	--	--	--	--	--
Amphipleura pellucida	--	--	--	--	--	38.6	--	--
Diploneis puella	--	--	--	11.7	--	--	--	--
Epithemia sorex	--	--	--	--	13.4	--	--	--
Navicula cincta	--	--	16.9	--	12.8	--	21.6	19.9
Navicula pavillardii	--	--	--	--	--	--	--	16.8
Nitzschia frustulum	14.7	--	15.3	13.1	--	--	--	16.1
Nitzschia longissima	--	--	--	16.6	--	--	--	12.4
Nitzschia microcephala	--	10.5	--	--	--	--	--	--

Table K171. Tentative species list of diatoms (Bacillariophyceae) collected from streams draining the southern Fort Union region in southeastern Montana (the first page of six pages).

Achnanthes affinis Grun.
A. clevei Grun.
A. deflexa Reim.
A. exigua Grun.
A. exilis Kutz.
A. flexella (Kutz.) Grun.
A. hauckiana Grun.
A. hauckiana var. rostrata Schulz
A. hungarica (Grun.) Grun.
A. lanceolata (Breb.) Grun.
A. lanceolata var. dubia Grun.
A. lanceolata var. haynaldii (Istv.-Schaarsch) Cl.
A. linearis (W. Sm.) Grun.
A. linearis f. curta H. L. Sm.
A. marginulata Grun.
A. minutissima Kutz.
A. pinnata Hust.
A. wellsiae Reim. nom. nov.
A. sp.
Amphipleura pellucida Kutz.
Amphora coffeiformis (Ag.) Kutz.
A. ovalis (Kutz.) Kutz.
A. ovalis var. affinis (Kutz.) V. H. ex DeT.
A. ovalis var. pediculus (Kutz.) V. H.
A. perpusilla (Grun.) Grun.
A. submontana Hust.
A. veneta (Kutz.) Hust.
A. sp.
Anomoeoneis sphaerophora (Ehr.) Pfitz.
A. vitrea (Grun.) Ross comb. nov.
Asterionella formosa Hass.
Bacillaria paradoxa Gmelin
Biddulphia laevis Ehr.
Caloneis alpestris (Grun.) Cl.
Caloneis amphisbaena (Bory) Cl.
C. bacillaris (Greg.) Cl.
C. bacillaris var. thermalis (Grun.) A. Cl.
C. bacillum (Grun.) Cl.
C. hyalina Hust.
C. lewisii Patr.
C. limosa (Kutz.) Patr. comb. nov.
C. ventricosa (Ehr.) Meist.
C. ventricosa var. alpina (Cl.) Patr. comb. nov.
C. ventricosa var. truncatula (Grun.) Meist.
C. sp.
Chaetoceros sp.
Cocconeis diminuta Pant.
C. pediculus Ehr.
C. placentula Ehr.
C. placentula var. euglypta (Ehr.) Cl.
C. placentula var. lineata (Ehr.) V. H.
Cyclotella glomerata Bachmann
C. meneghiniana Kutz.
C. pseudostelligera Hust.
C. striata (Kutz.) Grun.
C. striata var. bipunctata Fricke
C. sp.
Cylindrotheca gracilis (Breb.) Grun.
Cymatopleura elliptica (Breb.) W. Sm.
C. elliptica var. nobilis (Hantzsch) Hust.
C. solea (Breb. & Godey) W. Sm.
C. solea var. regula (Ehr.) Grun.
Cymbella affinis Kutz.
C. angustata (W. Sm.) Cl.
C. brehmii Hust.
C. cistula (Ehr.) Kirchn.
C. cymbiformis Ag.
C. cymbiformis var. nonpunctata Font.

Table K171. Continued (the second page of six pages).

Cymbella delicatula Kutz.
C. hustedtii Krasske
C. laevis Naegeli
C. lanceolata (Ag.) Ag.
C. leptoceros (Ehr.) Kutz.
C. lunata W. Sm.
C. mexicana (Ehr.) Cl.
C. microcephala Grun.
C. minuta Hilse ex Rabh.
C. minuta var. pseudogracilis (Choln.) Reim.
C. minuta var. silesiaca (Bleisch ex Rabh.) Reim. comb. nov.
C. muelleri Hust.
C. muelleri f. ventricosa (Temp. & Perag.) Reim.
C. naviculiformis (Auersw. ex Rabh.) Kirchn.
C. prostrata (Berkeley) Cl.
C. prostrata var. auerswaldii (Rabh.) Reim. comb. nov.
C. pusilla Grun.
C. sinuata Greg.
C. triangulum (Ehr.) Cl.
C. tumida (Breb.) V. H.
C. tumidula Grun.
C. turgidula Grun.
C. sp.
Denticula elegans Kutz.
D. subtilis Grun.
D. tenuis Kutz.
D. sp.
Diatoma hiemale var. mesodon (Ehr.) Grun.
D. tenue Ag.
D. tenue var. elongatum Lyngb.
D. vulgare Bory
D. vulgare var. breve Grun.
D. vulgare var. linearis V. H.

Diploneis oblongella (Naeg. ex Kutz.) Ross
D. oculata (Breb.) Cl.
D. pseudovalis Hust.
D. puella (Schum.) Cl.
D. sp.
Entomoneis alata (Ehr.) Ehr.
E. paludosa (W. Sm.) Reim. comb. nov.
Epithemia adnata (Kutz.) Breb.
E. adnata var. minor (Perag. & Herib.) Patr. comb. nov.
E. adnata var. porcellus (Kutz.) Patr. comb. nov.
E. adnata var. probocidea (Kutz.) Patr. comb. nov.
E. emarginata Andrews
E. sorex Kutz.
E. turgida (Ehr.) Kutz.
E. sp.
Eunotia sp.
Fragilaria bicapitata A. Mayer
F. brevistriata Grun.
F. capucina Desm.
F. capucina var. acuta Grun.
F. capucina var. lanceolata Grun.
F. capucina var. mesolepta Rabh.
F. construens (Ehr.) Grun.
F. construens var. pumila Grun.
F. construens var. venter (Ehr.) Grun.
F. crotonensis Kitton
F. intermedia Grun.
F. pinnata Ehr.
F. vaucheriae (Kutz) Peters
F. vaucheriae var. capitellata (Grun.) Peters
F. sp.
Frustulia vulgaris (Thwaites) DeT.
F. Sp.
Gomphoneis eriense (Grun.) Skv. & Meyer
G. herculeana (Ehr.) Cl.

Table K171. Continued (the third page of six pages).

Gomphoneis herculeana var. robusta (Grun.) Cl.
G. sp.
Gomphonema acuminatum Ehr.
G. affine Kutz.
G. affine var. insigne (Greg.) Andrews
G. angustatum (Kutz.) Rabh.
G. angustatum var. citera (Hohn. & Hellerm.) Patr. comb. nov.
G. angustatum var. intermedia Grun.
G. angustatum var. obtusatum (Kutz.) Grun.
G. angustatum var. sarcophagus (Greg.) Grun.
G. bohemicum Reich. ex Fricke
G. brebissonii (Kutz.)
G. dichotomum Kutz.
G. dubravicense Pant.
G. gracile Ehr. emend. V. H.
G. grunowii Patr.
G. intricatum Kutz.
G. intricatum var. vibrio (Ehr.) Cl.
G. olivaceum (Lyngb.) Kutz.
G. olivaceum var. calcarea (Cl.) Cl.
G. parvulum Kutz.
G. subclavatum (Grun.) Grun.
G. subclavatum var. commutatum (Grun.) A. Mayer
G. subclavatum var. mexicanum (Grun.) Patr.
G. tenellum Kutz.
G. tergestinum (Grun.) Fricke
G. truncatum Ehr.
G. sp.
Gyrosigma acuminatum (Kutz.) Rabh.
G. macrum (W. Sm.) Cl.
G. prolongatum (W. Sm.) Cl.
G. scalproides (Rabh.) Cl.
G. sciotense (Sulliv. & Wormley) Cl.
G. spencerii (Quek.) Griff. & Henfr.
Gyrosigma spencerii var. curvula (Grun.) Reim. comb. nov.
G. sp.
Hantzschia amphioxys (Ehr.) Grun.
H. amphioxys f. capitata Hust.
Mastogloia elliptica var. danseii (Thwaites) Cl.
M. smithii Thwaites ex W. Sm.
M. smithii var. lacustris Grun.
M. sp.
Melosira granulata (Ehr.) Ralfs.
M. granulata var. angustissima Mull.
M. varians Ag.
Meridion circulare (Grev.) Ag.
Navicula accomoda Hust.
N. anglica Ralfs.
N. anglica var. subsalsa (Grun.) Cl.
N. arvensis Hust.
N. atomus (Kutz.) Grun.
N. biconica Patr.
N. canalis Patr.
N. capitata Ehr.
N. capitata var. hungarica (Grun.) Ross
N. cincta (Ehr.) Ralfs.
N. cincta var. rostrata Reim.
N. circumtexta Meist. ex Hust.
N. clementis Grun.
N. clementis var. linearis Brander
N. cryptocephala Kutz.
N. cryptocephala f. terrestris Lund.
N. cryptocephala var. exilis (Kutz.) Grun.
N. cryptocephala var. perminuta Grun.
N. cryptocephala var. subsalina Hust.
N. cryptocephala var. veneta (Kutz.) Rabh.
N. cuspidata (Kutz.) Kutz.
N. decussis Østr.

Table K171. Continued (the fourth page of six pages).

Navicula elginensis (Greg.) Ralfs.
N. exigua Greg. ex Grun.
N. exigua var. capitata Patr.
N. gastrum var. signata A. Schmidt
N. gemmifera Simonsen
N. gottlandica Grun.
N. graciloides A. Mayer
N. gregaria Donk.
N. halophila (Grun.) Cl.
N. halophila f. tenuirostris Hust.
N. heufleri Grun.
N. heufleri var. leptocephala (Breb. & Grun.) Patr.
N. hustedtii Krasske
N. inflexa Greg.
N. insociabilis Krasske
N. insociabilis var. dissipatoides Hust
N. integra (W. Sm.) Ralfs.
N. laevissima Kutz.
N. lanceolata (Ag.) Kutz.
N. lundstromii Cl.
N. menisculus Schum.
N. menisculus var. upsaliensis (Grun. in Cl. & Grun.) Grun.
N. minima Grun.
N. minnewaukonensis Elm.
N. minuscula Grun.
N. muralis Grun.
N. mutica Kutz.
N. mutica var. cohnii (Hilse) Grun.
N. mutica var. undulata (Hilse) Grun.
N. muticopsis Van Heurck
N. notha Wallace
N. oblonga (Kutz.) Kutz.
N. odiosa Wallace
N. pavillardii Hust.

Navicula pelliculosa (Breb. ex Kutz.) Hilse
N. peregrina (Ehr.) Kutz.
N. peregrina f. minor Kolbe
N. platystoma Ehr.
N. protracta Grun.
N. pseudoreinhardtii Patr.
N. pupula Kutz.
N. pupula var. capitata Skv. & Meyer
N. pupula var. mutata (Krasske) Hust.
N. pupula var. rectangularis (Greg.) Grun.
N. pygmaea Kutz.
N. radiosa Kutz.
N. radiosa var. parva Wallace
N. radiosa var. tenella (Breb. & Kutz.) Grun.
N. rhynchocephala Kutz.
N. rhynchocephala var. amphiceros (Kutz.) Grun.
N. rhynchocephala var. germanii (Wallace) Patr. comb. nov.
N. salinarum Grun.
N. salinarum var. tenuirostris A. Cl.
N. schroeteri var. escambia Patr.
N. scutelloides W. Sm. ex Greg.
N. secreta Krasske
N. seminulum Grun.
N. simplex Krasske
N. subhamulata Grun.
N. subsulcatoides Hust.
N. symmetrica Patr.
N. tackei Hust.
N. tenelloides Hust.
N. tenera Hust.
N. tripunctata (O.F. Mull.) Bory
N. tripunctata var. schizonemoides (V. H.) Patr.
N. viridula (Kutz.) Kutz.
N. viridula var. avenacea (Breb. & Grun.) V. H.

Table K171. Continued (the fifth page of six pages).

Navicula viridula var. rostellata (Kutz.?) Cl.
N. zanoni Hust.
N. sp.
Neidium affine (Ehr.) Pfitz.
N. dubium (Ehr.) Cl.
Nitzschia acicularis (Kutz.) W. Sm.
N. amphibia Grun.
N. angustata (W. Sm.) Grun.
N. angustata var. acuta Grun.
N. apiculata (Greg.) Grun.
N. balatonis Grun.
N. bergii A. Cl.
N. bulnheimiana (Rabh.) H. L. Sm.
N. capitellata Hust.
N. clausii Hantz.
N. closterium (Ehr.) W. Sm.
N. communis Rabh.
N. commutata Grun.
N. denticula Grun.
N. dissipata (Kutz.) Grun.
N. elliptica Hust.
N. epiphytica O. Mull.
N. fasciculata Grun.
N. filiformis (W. Sm.) Hust.
N. flexa Schumann
N. fonticola Grun.
N. frustulum Kutz.
N. frustulum var. perpusilla (Rabh.) Grun.
N. frustulum var. subsalina Hust.
N. goetzeana var. gracilior Hust.
N. gracilis Hantz.
N. hantzschiana Rabh.
N. hungarica Grun.
N. hybrida Grun.
N. ignorata Krasske
Nitzschia kutzingiana Hilse
N. linearis (Ag. ex W. Sm.) W. Sm.
N. longissima var. reversa Grun.
N. lorenziana Grun.
N. lorenziana var. subtilis Grun.
N. microcephala Grun.
N. obtusa W. Sm.
N. obtusa var. scalpelliformis Grun.
N. palea (Kutz.) W. Sm.
N. paleacea Grun.
N. parvula Lewis
N. pseudofonticola Hust.
N. punctata (W. Sm.) Grun.
N. punctata var. curta Grun.
N. recta Hantz.
N. regula Hust.
N. romana Grun.
N. sicula (Castr.) Hust.
N. sigma (Kutz.) W. Sm.
N. sigmoidea (Ehr.) W. Sm.
N. stagnorum Rabh.
N. sublinearis Hust.
N. subtilis Kutz.
N. thermalis Kutz.
N. tryblionella Hantz.
N. tryblionella var. debilis (Arnott) A. Mayer
N. tryblionella var. levidensis (W. Sm.) Grun.
N. tryblionella var. victoriae Grun.
N. valdestriata Aleem & Hust.
N. vermicularis (Kutz.) Hant.
N. vitrea Norman
N. vitrea var. salinarum Grun.
N. sp.
Opephora sp.

Table K171. Continued (the sixth page of six pages).

Pinnularia abaujensis var. linearis (Hust.) Patr.
P. appendiculata (Ag.) Cl.
P. appendiculata var. budensis Grun.
P. borealis Ehr.
P. brebissonii (Kutz.) Rabh.
P. globiceps var. krookei Grun.
P. microstauron (Ehr.) Cl.
P. stomatophora (Grun.) Cl.
P. streptoraphe Cl.
P. viridis (Nitzsch.) Ehr.
P. viridis var. minor Cl.
P. sp.
Pleurosigma delicatulum W. Sm.
Rhoicosphenia curvata (Kutz.) Grun.
Rhopalodia gibba (Ehr.) O. Mull.
R. gibba var. ventricosa (Kutz.) H. & M. Perag.
R. gibberula (Ehr.) O. Mull.
R. gibberula var. vanheurckii O. Mull.
R. musculus (Kutz.) O. Mull.
Stauroneis acuta W. Sm.
S. phoenicenteron f. gracilis (Ehr.) Hust.
S. smithii Grun.
Stephanodiscus astraea (Ehr.) Grun.
S. dubius (Fricke) Hust.
S. hantzschii Grun.
S. minutus Cl. & Moll.
S. subtilis Van Goor
S. tenuis Hust.
S. sp.
Surirella angustata Kutz.
S. brightwellii W. Sm.
S. iowensis Lowe
S. ovalis Breb.
S. ovata Kutz.
Surirella ovata var. pinnata (W. Sm.)
S. patella Ehr.
S. spiralis Kutz.
S. tenera Greg.
S. sp.
Synedra acus Kutz.
S. capitata Ehr.
S. delicatissima W. Sm.
S. famelica Kutz.
S. fasciculata (Ag.) Kutz.
S. fasciculata var. truncata (Grev.) Patr.
S. filiformis Grun.
S. filiformis var. exilis Cl.-Eul.
S. minuscula Grun.
S. nana Meist.
S. parasitica (W. Sm.) Hust.
S. parasitica var. subconstricta (Grun.) Hust.
S. pulchella Ralfs. ex Kutz.
S. pulchella var. lacerata Hust.
S. radians Kutz.
S. rumpens Kutz.
S. rumpens var. fragilarioides Grun.
S. socia Wallace
S. tenera W. Sm.
S. ulna (Nitz.) Ehr.
S. ulna var. contracta Østra.
S. ulna var. danica (Kutz.) V. H.
S. ulna var. ramesi (Herib.) Hust.
S. ulna var. spathulifera (Grun.) Vl. H.
S. ulna var. subaequalis (Grun.) V. H.
S. sp.
Thalassiosira fluviatilis Hust.
T. pseudonana (Hust.) H. & H.
T. sp.

Table L172. Examples of the data summaries for a complete standard examination of natural substrate periphyton samples obtained from seven stream sampling sites in the coalfield study area; the numbers are the percent relative abundance (PRA) values of "major" diatom species with PRA's greater than 0.6% at two or more of the stations (the first page of two pages).

	Stream-Station*													
	UHWCr		LHWCr		Mizpah		Otter-A		Pumpkin		Rsbd-Ki		Tr-PyrB	
Taxa/Sampling Season#	MJne	LJne	MJne	LJne	MJne	EJly	MJne	EJly	MJne	EJly	MJne	LJne	LJne	MJly
Achnanthes minutissima	5.0	13.8	4.4	19.7	7.8	0	4.1	6.7	--	--	1.3	2.7	1.5	1.3
Amphora perpusilla	0	0.3	2.3	0.6	--	--	0.9	4.8	--	--	5.0	0.3	1.5	0.8
A. veneta	--	--	--	--	5.2	5.0	--	--	0	10.0	--	--	0	tr
Caloneis bacillum	--	--	2.9	0.3	0.9	0	--	--	--	--	--	--	--	--
Cocconeis placentula	--	--	0.9	0.3	--	--	tr	0	--	--	1.6	tr	1.2	0.3
Cyclotella meneghiniana	7.7	4.1	2.3	1.8	0.9	0	11.4	6.7	0.3	0	0.6	0.6	0	0.3
Cymbella affinis	0.9	0.3	1.2	18.2	0	1.0	0	0.3	--	--	0.9	10.0	10.7	4.3
C. minuta	0.3	0	0	2.5	0.9	2.0	--	--	9.6	3.3	0.3	0.3	4.3	4.3
Denticula sp.	--	--	0	0.3	0	4.0	0	1.0	--	--	--	--	--	--
Diatoma tenue	0	0.9	--	--	--	--	1.3	0	--	--	--	--	--	--
D. tenue v. elongatum	3.8	0	0.9	1.5	--	--	--	--	--	--	--	--	--	--
D. vulgare	--	--	--	--	--	--	--	--	--	--	1.3	1.5	7.0	33.4
Diploneis puella	0.9	1.5	0.9	0.4	--	--	--	--	--	--	--	--	--	--
Entomoneis ornata	0.3	0.3	1.2	tr	--	--	1.3	0.6	--	--	--	--	--	--
E. paludosa	0.3	0.6	15.5	2.2	--	--	8.5	1.3	--	--	--	--	--	--
Fragilaria crotenensis	--	--	--	--	--	--	0.3	0	2.5	0	0.9	0	0	3.2
F. vaucheriae	--	--	2.5	1.5	--	--	0.6	1.0	--	--	0.9	0.3	0.3	0.8
Gomphonema angustatum	0.6	0	0.6	4.6	--	--	--	--	4.3	0	0.6	6.0	0.3	0
G. olivaceum	--	--	0	0.9	--	--	0.3	0.6	--	--	17.5	23.6	3.7	0.5
G. parvulum	0.3	0.6	--	--	--	--	--	--	7.4	0	0	2.1	1.2	0.3

*UHWCr: upper Hanging Woman Creek near Quietus-Decker; LHWCr: lower Hanging Woman Creek near Birney; Mizpah: Mizpah Creek near Mizpah; Otter-A: lower Otter Creek near Ashland; Pumpkin: Pumpkin Creek near Miles City; Rsbd-K: upper Rosebud Creek near Kirby; TR-PyrB: Tongue River near Pyramid Butte-Birney.

#Mid-June (MJne), late June (LJne), early July (EJly), and mid-July (MJly).

tr--Indicates a trace amount; v--denotes a varietal name; ?--indicates some taxonomic uncertainty.

Table L172. Continued (the second page of two pages).

Taxa/Sampling Season#	Stream-Station*													
	UHWCr		LHWCr		Mizpah		Otter-A		Pumpkin		Rsbd-Ki		TR-PyrB	
	MJne	LJne	MJne	LJne	MJne	EJly	MJne	EJly	MJne	EJly	MJne	LJne	LJne	MJly
Navicula capitata v. hungarica	tr	0.9	0	tr	--	--	0.9	0.3	--	--	--	--	--	--
N. cincta	12.4	3.8	2.6	11.4	0	3.0	16.7	9.5	0	3.3	--	--	--	--
N. cryptocephala	--	--	--	--	--	--	--	--	--	--	2.2	13.3	4.3	2.4
N. cryptocephala v. veneta	1.5	5.3	2.6	1.5	1.7	0	1.3	0.3	0.3	0	3.4	5.5	4.9	3.2
N. heufleri v. leptocephala	0.9	0.3	0.3	0	--	--	2.8	0	0	3.3	--	--	--	--
N. lamii	--	--	--	--	2.6	0	--	--	9.3	0	--	--	0.3	0
N. radiosa v. parva	--	--	--	--	--	--	--	--	--	--	1.3	0.3	0.3	3.5
N. secreta v. apiculata	0.6	2.9	3.5	3.0	--	--	1.7	1.3	--	--	2.2	0.6	0	tr
N. tripunctata	0	tr	--	--	--	--	--	--	--	--	2.5	0.6	5.5	4.6
N. viridula v. avenacea	--	--	0.9	0.6	--	--	--	--	--	--	21.9	5.8	0.6	0.3
Navicula sp.	--	--	--	--	0	3.0	--	--	3.4	0	0.3	0	--	--
Nitzschia acicularis	0.6	0.9	3.2	0	--	--	2.5	2.2	9.9	0	0.3	0.9	--	--
N. apiculata	0.3	1.2	2.6	0.9	--	--	2.2	0.3	--	--	0	tr	--	--
N. clausii	--	--	--	--	0	2.0	--	--	4.9	0	--	--	--	--
N. communis	0.3	2.3	1.2	1.2	--	--	0.6	1.6	0.3	3.3	--	--	--	--
N. dissipata	0	0.3	0.6	tr	--	--	0.6	0	--	--	7.5	6.7	0	7.5
N. frustulum	5.3	1.8	0.6	0.3	1.7	0	2.2	4.4	--	--	1.6	0	1.2	0
N. frustulum v. subsalina	0	19.0	1.8	3.0	49.6	59.0	2.8	7.6	0.3	63.3	0	1.2	0.6	2.7
N. gracilis	--	--	--	--	--	--	5.4	2.2	2.5	0	2.8	0	0.9	0
N. hungarica	0.9	0	0.6	0.3	--	--	0.9	0	--	--	--	--	--	--
N. palea	11.8	11.7	5.8	3.0	4.3	0	10.1	9.2	42.8	0	5.3	3.9	5.5	0.3
N. paleacea	0	0.9	0.6	0	3.5	0	1.3	0.6	--	--	1.3	0.6	--	--
Pleurosigma delicatulum	0.3	0.3	4.7	2.8	--	--	0.9	4.1	0	3.3	1.3	0	--	--
Rhoicosphenia curvata	0	1.2	0.6	0.6	--	--	0.6	9.8	--	--	--	--	4.3	1.0
Stephanodiscus minutus	--	--	--	--	--	--	1.9	0	--	--	0	1.8	1.2	0
Stephanodiscus sp.	6.8	4.7	5.0	0.6	--	--	0.3	14.9	0.3	0	--	--	--	--
Surirella ovata	0.3	0	6.7	4.0	--	--	1.6	0	0.3	0	1.9	1.8	0.6	0.3
Synedra acus	8.3	0.3	2.0	2.2	--	--	--	--	--	--	--	--	--	--
S. famelica	21.2	9.4	1.2	1.8	--	--	0.3	0	--	--	--	--	--	--
S. fasciculata	0.3	1.5	0.3	0.3	--	--	1.3	1.9	--	--	--	--	--	--
S. radians?	0.9	0	1.5	0	--	--	0.3	0	--	--	--	--	--	--

Table L173. Examples of the data summaries for a complete standard examination of natural substrate periphyton samples obtained from seven stream sampling sites in the coalfield study area; the numbers are the percent relative abundance (PRA) values of "sub-major" diatom species with PRA's greater than 0.6% at one of the stations (the first page of two pages).

	Stream-Station*													
	UHWCr		LHWCr		Mizpah		Otter-A		Pumpkin		Rsbd-Ki		TR-PyrB	
Taxa/Sampling Season#	MJne	LJne	MJne	LJne	MJne	EJly	MJne	EJly	MJne	EJly	MJne	LJne	LJne	MJly
Achnanthes lanceolata	tr	0	tr	0.6	--	--	--	--	--	--	2.2	0.3	0.3	0.3
Caloneis hyalina?	--	--	--	--	0.9	0	--	--	--	--	--	--	--	--
C. ventricosa v. trunculata	1.2	0	--	--	--	--	--	--	--	--	--	--	--	--
Caloneis sp.	0	1.8	0	0.3	--	--	--	--	0.3	0	--	--	--	--
Cocconeis pediculus	--	--	--	--	--	--	--	--	--	--	2.2	0.3	--	--
Cymbella sp.	--	--	--	--	0	2.0	--	--	--	--	0.3	0	--	--
Fragilaria capucina v. mesolepta	--	--	--	--	--	--	--	--	--	--	--	--	12.5	5.7
F. construens v. venter	--	--	1.8	0	--	--	--	--	--	--	--	--	--	--
Gomphonema angustatum v. citera	--	--	--	--	--	--	--	--	--	--	1.3	0	tr	0
G. angustatum v. intermedia	--	--	--	--	--	--	--	--	--	--	0	6.0	--	--
G. bohemicum	--	--	--	--	--	--	--	--	--	--	--	--	3.7	1.3
G. olivaceum v. calcarea	--	--	--	--	--	--	--	--	--	--	0.9	0	--	--
G. tergestinum	--	--	--	--	--	--	--	--	--	--	--	--	3.2	1.0
Gomphonema sp.	0	0.3	--	--	0	3.0	--	--	--	--	0.3	0	--	--
Hantzschia amphioxys	0	tr	--	--	0	1.0	--	--	0.3	0	--	--	--	--
Melosira varians	--	--	--	--	--	--	--	--	--	--	--	--	5.5	14.0

*UHWCr: upper Hanging Woman Creek near Quietus-Decker; LHWCr: lower Hanging Woman Creek near Birney; Mizpah: Mizpah Creek near Mizpah; Otter-A: lower Otter Creek near Ashland; Pumpkin: Pumpkin Creek near Miles City; Rsbd-K: upper Rosebud Creek near Kirby; TR-PyrB: Tongue River near Pyramid Butte-Birney.

#Mid-June (MJne), late June (LJne), early July (EJly), and mid-July (MJly).

tr--Indicates a trace amount; v--denotes a varietal name; ?--indicates some taxonomic uncertainty.

Table L173. Continued (the second page of two pages).

Taxa/Sampling Season#	Stream-Station*													
	UHWCr		LHWCr		Mizpah		Otter-A		Pumpkin		Rsbd-Ki		TR-PyrB	
	MJne	LJne	MJne	LJne	MJne	EJly	MJne	EJly	MJne	EJly	MJne	LJne	LJne	MJly
Navicula capitellata	--	--	--	--	--	--	--	--	0	3.3	--	--	--	--
N. cincta v. rostrata	2.9	4.4	0.6	0	--	--	0.6	0.6	--	--	0	0.3	--	--
N. mutica	--	--	--	--	0	5.0	--	--	--	--	--	--	--	--
N. mutica v. undulata	--	--	--	--	0	2.0	--	--	--	--	--	--	--	--
N. perparva	--	--	--	--	0	1.0	--	--	--	--	--	--	0	0.3
N. rhynchocephala	-	--	0	0.3	0.9	0	--	--	--	--	--	--	--	--
N. tenelloides	0	0.3	--	--	0	2.0	--	--	--	--	--	--	--	--
Nitzschia amphibia	--	--	--	--	15.7	3.0	0.3	0	--	--	--	--	0.3	0
N. epiphytica	--	--	--	--	--	--	tr	0	--	--	--	--	7.0	0
N. filiformis	0.3	0	0	0.3	--	--	2.2	2.2	--	--	--	--	--	--
N. hantzschiana	0	tr	0	0.3	--	--	--	--	--	--	--	--	1.2	0
N. linearis	0.3	0	0.3	0	--	--	--	--	0.3	0	1.3	0.3	0	tr
N. longissima v. reversa	0.3	0.6	0.3	0	--	--	6.0	0.3	tr	0	--	--	--	--
N. romana	0	tr	--	--	--	--	--	--	--	--	0.9	0.3	--	--
N. sigmoidea	--	--	0.9	0	--	--	--	--	--	--	--	--	--	--
N. tryblionella v. levidensis	--	--	tr	0	--	--	--	--	0	3.3	--	--	--	--
N. valdestriata	--	--	--	--	3.5	1.0	--	--	--	--	--	--	--	--
Nitzschia sp.	--	--	--	--	0	1.0	--	--	--	--	--	--	--	--
Pinnularia borealis	--	--	--	--	--	--	--	--	0	3.3	--	--	--	--
Stephanodiscus hantzschii	--	--	--	--	--	--	0	0.6	--	--	1.3	0	0	0.3
S. subtilis	--	--	--	--	--	--	tr	0	--	--	1.3	0	0.3	0
Synedra filiformis	0	0.6	6.1	3.0	--	--	--	--	--	--	--	--	--	--
S. ulna	0.3	0	0	0.3	--	--	--	--	--	--	--	--	2.4	0
S. ulna v. contractica	--	--	--	--	--	--	--	--	--	--	--	--	0.9	0.3

Table L174. Examples of the data summaries for a complete standard examination of natural substrate periphyton samples obtained from seven stream sampling sites in the coalfield study area; the numbers are the percent relative abundance (PRA) values of "minor" diatom species with PRA's equal to or less than 0.6% at all of the stations (the first page of three pages).

	Stream-Station*													
	UHWCr		LHWCr		Mizpah		Otter-A		Pumpkin		Rsbd-Ki		TR-PyrB	
Taxa/Sampling Season#	MJne	LJne	MJne	LJne	MJne	EJly	MJne	EJly	MJne	EJly	MJne	LJne	LJne	MJly
Achnanthes clevei	--	--	--	--	--	--	--	--	--	--	--	--	0.3	0
A. deflexa?	--	--	--	--	--	--	--	0.3	--	--	--	--	--	--
Amphipleura pellucida	tr	0.3	0.3	0	--	--	--	--	--	--	--	--	--	--
Amphora coffeiformis	tr	0	--	--	--	--	--	--	--	--	--	--	--	--
A. ovalis v. affinis	--	--	0.6	0	--	--	0.3	0	--	--	--	--	--	--
A. ovalis v. pediculus	--	--	--	--	--	--	0.3	0	--	--	--	--	--	--
A. submontana	--	--	0.6	0	--	--	--	--	--	--	0.3	0	--	--
Anomoeoneis sphaerophora	-	--	0.3	0	--	--	--	--	--	--	--	--	--	--
Bacillaria paradoxa	--	--	--	--	--	--	0	tr	--	--	--	--	--	--
Caloneis amphisbaena	--	--	0	0.3	--	--	0.3	0	--	--	--	--	--	--
Cymbella cymbiformis	--	--	0	tr	--	--	--	--	--	--	--	--	--	--
C. delicatula	0.3	0	--	--	--	--	--	--	--	--	--	--	--	--
C. microcephala	--	--	--	--	--	--	0.3	0.6	--	--	--	--	--	--
C. prostrata	--	--	--	--	--	--	--	--	--	--	0.3	0	--	--
C. pusilla	--	--	--	--	--	--	0.3	0	--	--	--	--	--	--
C. sinuata	--	--	--	--	--	--	--	--	--	--	--	--	0.6	0.3
C. triangulum	--	--	--	--	--	--	--	--	--	--	--	--	0.3	0
Denticula tenuis	0.3	0.6	--	--	--	--	--	--	--	--	--	--	--	--
D. elegans	--	--	0.3	0	--	--	--	--	--	--	--	--	--	--
Fragilaria sp.	tr	0	--	--	--	--	--	--	--	--	--	--	--	--

*UHWCr: upper Hanging Woman Creek near Quietus-Decker; LHWCr: lower Hanging Woman Creek near Birney; Mizpah: Mizpah Creek near Mizpah; Otter-A: lower Otter Creek near Ashland; Pumpkin: Pumpkin Creek near Miles City; Rsbd-K: upper Rosebud Creek near Kirby; TR-PyrB: Tongue River near Pyramid Butte-Birney.

#Mid-June (MJne), late June (LJne), early July (EJly), and mid-July (MJly).

tr--Indicates a trace amount; v--denotes a varietal name; ?--indicates some taxonomic uncertainty.

Table L174. Continued (the second page of three pages).

Taxa/Sampling Season#	Stream-Station*													
	UHWCr		LHWCr		Mizpah		Otter-A		Pumpkin		Rsbd-Ki		TR-PyrB	
	MJne	LJne	MJne	LJne	MJne	EJly	MJne	EJly	MJne	EJly	MJne	LJne	LJne	MJly
Gomphonema affine	--	--	0	0.3	--	--	--	--	--	--	--	--	--	--
G. dichotomum	--	--	0.6	0	--	--	--	--	--	--	--	--	--	--
G. intricatum	--	--	--	--	--	--	0.3	0	--	--	--	--	0	0.3
G. subclavatum v. commutatum	0	tr	--	--	--	--	--	--	--	--	--	--	--	--
G. subclavatum v. mexicanum	tr	0	--	--	--	--	--	--	--	--	--	--	--	--
Gyrosigma macrum?	--	--	0	tr	--	--	--	--	--	--	--	--	--	--
G. spenceri v. curvuca	--	--	--	--	--	--	0	0.3	--	--	--	--	--	--
Gyrosigma sp.	0	0.6	--	--	--	--	--	--	--	--	--	--	--	--
Mastogloia smithii	tr	0	--	--	--	--	--	--	--	--	--	--	--	--
Melosira granulata v. angustatum	--	--	--	--	--	--	--	--	--	--	--	--	0	tr
Navicula anglica v. subsalsa	--	--	--	--	--	--	--	--	--	--	0.3	0	0.3	0
N. arvensis	--	--	--	--	--	--	--	--	--	--	--	--	0.3	0
N. accomoda	--	--	--	--	--	--	--	--	--	--	--	--	0.6	0
N. atomus	--	--	--	--	--	--	--	--	--	--	0.3	0	--	--
N. circumtexa	--	--	0.3	0	--	--	tr	0	--	--	--	--	--	--
N. cuspidata	--	--	0	0.3	--	--	--	--	--	--	--	--	--	--
N. gemnifera	--	--	--	--	--	--	tr	0	--	--	--	--	--	--
N. gottlandica	--	--	--	--	--	--	--	--	--	--	--	--	0.3	--
N. halophila v. tenuirostris	--	--	--	--	--	--	0.6	0	--	--	--	--	--	--
N. heufleri	--	--	0	tr	--	--	0.6	0	--	--	--	--	--	--
N. minnewaukonensis	--	--	--	--	--	--	0.6	0.3	--	--	--	--	--	--
N. notha?	--	--	--	--	tr	0	--	--	--	--	--	--	--	--
N. odiosa	--	--	0	0.3	--	--	--	--	--	--	--	--	--	--
N. peregrina	--	--	0.6	0.3	--	--	--	--	--	--	--	--	--	--
N. pygmaea	0.3	0.3	--	--	--	--	--	--	--	--	--	--	--	--
N. radiosa v. tenella	--	--	--	--	--	--	--	--	--	--	--	--	tr	0
N. salinarum	tr	0	--	--	--	--	--	--	--	--	--	--	--	--
N. tripunctata v. schizonemoides	0.6	0	--	--	--	--	--	--	--	--	--	--	--	--

Table L174. Continued (the third page of three pages).

Taxa/Sampling Season#	Stream-Station*													
	UHWCr		LHWCr		Mizpah		Otter-A		Pumpkin		Rsbd-Ki		TR-PyrB	
	MJne	LJne	MJne	LJne	MJne	EJly	MJne	EJly	MJne	EJly	MJne	LJne	LJne	MJly
Nitzschia obtusa	--	--	--	--	--	--	--	--	0.3	0	--	--	--	--
N. sigma	--	--	--	--	--	--	0.6	0	--	--	--	--	--	--
N. tryblionella	--	--	0.3	0	--	--	0	0.3	--	--	--	--	--	--
Pinnularia abaujensis v. linearis	--	--	tr	0	--	--	--	--	--	--	--	--	--	--
Pinnularia sp.	--	--	--	--	--	--	0.3	0	--	--	--	--	--	--
Rhopalodia gibba	--	--	0.3	0	--	--	--	--	--	--	--	--	--	--
R. gibba v. ventricosa	--	--	--	--	--	--	0	0.3	--	--	--	--	--	--
R. musculus	--	--	--	--	--	--	0.3	0	--	--	--	--	--	--
Surirella augusta	--	--	--	--	--	--	--	--	--	--	0	tr	--	--
S. iowensis	--	--	0.6	0.3	--	--	--	--	--	--	--	--	--	--
S. ovalis	--	--	0.3	0	--	--	--	--	--	--	--	--	--	--
S. spiralis	--	--	0.6	0	--	--	--	--	--	--	--	--	--	--
Synedra parasitica	--	--	--	--	--	--	--	--	--	--	0.3	0	--	--
S. pulchella?	--	--	--	--	--	--	0.3	0	--	--	--	--	--	--
S. pulchella v. lacerata	0	0.3	--	--	--	--	--	--	--	--	--	--	--	--
S. rumpens	--	--	--	--	--	--	--	--	--	--	--	--	0.6	--
Synedra sp.	--	--	0	0.3	--	--	0	0.3	--	--	--	--	--	--

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